AD-A068 826 DYNAMICS RESEARCH CORP WILMINGTON MASS F/G 14/4
DIGITAL AVIONICS INFORMATION SYSTEM (DAIS): RELIABILITY AND MAI--ETC(U)
APR 79 A J CZUCHRY, R H KISTLER, J M GLASIER F33615-75-C-5218
UNCLASSIFIED AFHRL-TR-78-2(II) NL

1 OF 2
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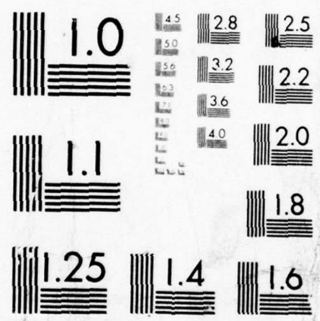
A068826



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NATIONAL BUREAU OF STANDARDS-1963-A

AFHRL-TR-78-2(II)

LEVEL III

AIR FORCE HUMAN RESOURCES LABORATORY

DIGITAL AVIONICS INFORMATION SYSTEM (DAIS): RELIABILITY AND MAINTAINABILITY MODEL USERS GUIDE

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April 1979
Final Report for Period May 1975 – July 1977

Approved for public release; distribution unlimited.

AIR FORCE SYSTEMS COMMAND
BROOKS AIR FORCE BASE, TEXAS 78235

NOTICE

This final report was submitted by Dynamics Research Corporation, 60 Concord Street, Wilmington, Massachusetts 01887, under contract F33615-75-C-5218, project 2051, with Advanced Systems Division, Air Force Human Resources Laboratory (AFSC), Wright-Patterson Air Force Base, Ohio 45433. Mr. H. Anthony Baran was the Contract Monitor for the Laboratory.

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Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER
AFHRL-TR-78-2(II)

2. GOVT ACCESSION NO.

3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle)
DIGITAL AVIONICS INFORMATION SYSTEM (DAIS): RELIABILITY AND MAINTAINABILITY MODEL. USERS GUIDE.

5. TYPE OF REPORT & PERIOD COVERED
Final rept.
May 1975 – Jul[redacted]977

6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s)
Andrew J. Czuchry
Robert H. Kistler
John M. Glasier
Marjorie A. Bristol
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8. CONTRACT OR GRANT NUMBER(s)
F33615-75-C-5218

9. PERFORMING ORGANIZATION NAME AND ADDRESS
Dynamics Research Corporation
60 Concord Street
Wilmington, Massachusetts 01887

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
63243F
20510001

11. CONTROLLING OFFICE NAME AND ADDRESS
HQ Air Force Human Resources Laboratory (AFSC)
Brooks Air Force Base, Texas 78235

12. REPORT DATE
Apr[redacted]79

139p.

13. NUMBER OF PAGES
138

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)
Advanced Systems Division
Air Force Human Resources Laboratory
Wright-Patterson Air Force Base, Ohio 45433

15. SECURITY CLASS. (of this report)
Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

The research reported herein was sponsored jointly by Air Force Human Resources Laboratory, Air Force Avionics Laboratory, and Air Force Logistics Command. It was performed and funded as part of the Digital Avionics Information System Advanced Development Program.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

availability analysis
avionics availability
avionics conceptual design configuration
avionics support requirements
digital avionics information system
life cycle cost
maintenance analysis
reliability and maintainability model

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The digital avionics information system (DAIS) life cycle cost (LCC) study provides the Air Force with an enhanced in-house capability to incorporate LCC considerations during all stages of the system acquisition process. This report documents a reliability and maintainability (R&M) model developed in the study and also serves as a users manual. The R&M model, a training model, and a cost model comprise the DAIS LCC impact model (LCCIM) designed for use in LCC analysis of avionics systems. In this context, its primary function is to manipulate input data banks to produce intermediate products, figures of merit, and outputs required by the training and cost models. When used in a stand-alone mode, the R&M model provides a means for analyzing the R&M impact of changes in system design and maintenance concepts on system support requirements.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE(*When Data Entered*)

Item 20 Continued:

The input data banks contain values for the R&M parameters of avionics hardware configurations, i.e., maintenance action rate, maintenance task event time, task event probability of occurrence, manpower required for each task, skill level requirements, and support equipment (SE) required for each task. The R&M model employs a figure of merit concept to aggregate the values for these R&M parameters to produce manhour and SE requirement estimates. These are point estimates; however, they can be used to (a) make comparisons on a total system, subsystem, or line replaceable unit (LRU) basis, and (b) identify "high drivers" or problem areas in terms of resource requirements. In addition, the R&M model can be used to conduct sensitivity and trade-off analyses in terms of resource requirements after it has identified high driver items. It can perturb combinations of R&M parameters to determine sensitivities. Thus, alternatives for achieving a reduction in resource requirements can be assessed by selectively altering input data and observing the model's outputs indicating the resultant changes in resource requirements.

This document is intended to guide the user of the R&M model. It describes the features of the model, its logical operations, its input data requirements, and its output reports. It also provides a program listing, instructions for preparing input data, and guidance for interpreting and using output reports.

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NTIS White Section
DDC Buff Section
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JUSTIFICATION
BY
DISTRIBUTION/AVAILABILITY CODES
Dist. AVAIL. and/or SPECIAL
A

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE(*When Data Entered*)

SUMMARY

This report is Volume II of AFHRL-TR-78-2 which describes a reliability and maintainability (R&M) model developed to facilitate the performance of design vs. cost trade-offs within the systems acquisition process. The model can provide timely visibility to relationships between system design and support requirements and a means of using them to avoid unnecessarily high system operation and maintenance cost. Stand-alone operation permits the user to assess potential impacts of design reliability factors on system support factors and operational availability. However, the R&M model was also designed to function as part of a modeling system which includes a training requirements analysis model and a system cost model. Joint operation provides the capability of translating the design impact assessments into estimates of the consequent cost of system operation and maintenance and, ultimately, that of performing design vs. cost trade-offs.

The R&M model operates in conjunction with a computerized data bank containing historical reliability and maintenance data gathered from operational systems. This data is made relevant to new systems by factoring the historical data on the basis of system/subsystem comparability analyses. Inputs to the R&M model include: the frequency of maintenance actions by subsystem and line replaceable unit (LRU) for both aircraft and support equipment (SE); and data concerning the task events within each maintenance action such as type, probability of occurrence, time to complete, manpower type and skill requirements, and SE requirements. The model uses these inputs to compute the manhour resources, SE, and spares consumed, by task event, to satisfy the maintenance requirements of each subsystem and its LRUs for both flight line and shop actions. Outputs are displayed in matrix format.

Capable of extremely rapid operation, the R&M model affords the user a powerful tool for answering a multitude of "what if" questions concerning the implications of system design on support requirements. Its speed facilitates iterative application and should promote trade-off analyses early in the design process when cost avoidance actions are most effective. This operational speed stems from the fact that, unlike simulation models sometimes used in this type of analysis, the R&M model does not attempt to account for peak loads, saturations, queues, or other nonlinear constraints that exist in the actual maintenance environment. Rather, it is an average value model which uses estimates of maintenance task and equipment R&M factor values to compute the average expected values for

resource requirements. Additionally, a figure of merit concept is employed to aggregate the detailed data outputs and generate structured data products which allow comparisons to be made and high resource consumers to be identified on either an LRU, subsystem, or system basis. An example of such a figure of merit is maintenance manhours per 1000 flight hours.

Apart from its ability to facilitate sensitivity and trade-off analyses, the R&M model can aid the user in determining the most acceptable means of avoiding undesirable potential impacts which it has identified. By comparing alternative cause and result situations, trade-off analyses can be employed in a more investigative manner. This entails an iterative model application to determine the differential effects on projected support resource requirements obtainable by changing combinations of R&M parameters. An example of such a trade-off might be the cost to achieve an increased subsystem reliability versus that to obtain a reduced flight line troubleshooting time. The user can determine the various combinations of reliability improvement and reduced flight line troubleshooting time to achieve a specified reduction in support resource requirements for that subsystem. These values would be inputted to training and cost portions of the modeling system to assist in evaluating alternatives on a total cost of ownership basis.

The initial application of the R&M model is directed at the determination of the potential impacts of the digital avionics information system (DAIS) on system support personnel requirements and life cycle cost. Results will be contained in a later technical report within the series of which this is a member. The model is, however, applicable in the development of almost any new system as well as the evaluation of existing systems.

This volume provides a complete guide to the operation of the R&M model in the stand alone mode. It describes the features and structure of the model, its input data requirements, its logical operations, and its output reports. It provides instructions and the format for preparing input data and for selecting output options. Sample output reports are also provided for each option that can be selected. A listing and description of potential error messages are included in the appendix, as well as a listing of the computer program.

PREFACE

This report is one of a series ot technical reports, models, and data banks produced under contract no. F33615-75-C-5218, "DAIS Life Cycle Costing Study." Results of this study, in combination with the present Air Force capabilities provide the means to assess the life cycle cost impact of the operational implementation of the Digital Avionics Information System (DAIS).

The study was directed by the Advanced Systems Division, Air Force Human Resources Laboratory, Wright-Patterson Air Force Base, Ohio, and is documented under Work Unit 20510001, "DAIS Life Cycle Costing Study." It was performed under Air Force Avionics Laboratory Program Element 63243F, "Digital Avionics Information System," as Project 2051. Project 2051, "Impact of the DAIS on Life Cycle Costs," is jointly sponsored by the Air Force Human Resources Laboratory, the Air Force Avionics Laboratory, and Air Force Logistics Command. Contract funds were provided by the Air Force Avionics Laboratory. The DAIS Program Manager is Lt. Col. Robert A. Dessert. The Air Force Human Resources Laboratory Project Scientist is Mr. H. Anthony Baran. The Air Force Logistics Command project otficer is Capt. Ronald Hahn. The latter two are DAIS deputy directors. The Contractor Program Manager is Mr. John C. Goclowski.

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DIGITAL AVIONICS INFORMATION SYSTEM (DAIS): RELIABILITY AND MAINTAINABILITY MODEL USERS GUIDE

I. INTRODUCTION

The reliability and maintainability (R&M) model, in conjunction with a cost model and a training model, make up a life cycle cost impact model (LCCIM). The R&M model is an analytical type batch process model that computes unique outputs based on a given set of values for R&M input variables. These inputs pertain to avionics subsystems and their line replaceable units (LRU). The principal data input elements consist of average times to complete maintenance task events, the associated probabilities of occurrence of those events, and the frequency of the equipment maintenance. Other R&M inputs include the type of task event; the number, type, and skill level of each manpower specialty needed to perform the task event; and the support equipment required.

The computed outputs of this model are "expected values" since they are based on average input values rather than on peak demands, or other constraints, such as queuing or the nonlinearities inherent in a "real world" type of simulation model. These outputs are principally measures of the maintenance manhour resource requirements which may be expected to result under a given set of conditions. These conditions are determined by system variables such as equipment configuration, equipment design, and/or the system support maintenance concept. The particulars of these conditions are made available to the model in terms of the R&M input variables previously described.

Main Features

The R&M model is available in Fortran IV language for both the Honeywell H-6000 and Control Data Corporation CDC-6600 Cyber 74 computers. It is characterized by the following:

- Unlimited flexibility in the representation of the avionics equipment structure
- Similarly structured output reports for all output parameters
- Selection for analysis of a single subsystem, all subsystems, or a categorical group of subsystems
- Automatic output of short summary reports, optional output of complete reports.

General Description

The primary purpose of the R&M model is to provide data input to the LCCIM cost model and training model. However, in a stand-alone operation, this model provides a means for analyzing the R&M impact of various avionics design and support concept parameters. It employs a figure of merit (FOM) concept to aggregate the data and then to make comparisons of resources required on a total system, subsystem, or LRU basis and to identify "high drivers" or problem areas of high resource requirements. FOM analyses within the model may address, for example, maintenance manhours per 1000 flight hours (measures maintenance manhour resource requirements) and service availability (measures the impact of maintenance on operational availability). The basic parameters used to calculate the FOMs for each subsystem, broken out for each shop and flight line maintenance task event, are:

- Probability of occurrence
- Average time to complete the event
- Air Force specialty and skill level
- Support equipment

The maintenance action rate for each subsystem is input as mean flight hours between maintenance actions.

By making reasonable variations in any of the foregoing input parameters, the model can be used to note the effect on the various outputs. In this way, the R&M model can be used to conduct sensitivity and trade-off analyses. Thus, after high driver items are identified in terms of resource requirements, combinations of R&M parameters can be perturbed to determine the system sensitivities. Alternatives for achieving reduction in the resources required can thus be identified.

Data Structure

The data represented in the R&M model are structured in matrix form permitting all outputs to be displayed in similar fashion. The data elements in each row of an output report convey information (such as mean time to repair (MTTR)) for each maintenance task event leading to a particular outcome that results from a maintenance action. The columns convey the same information for a selected maintenance task event.

A maintenance action is defined as any subsystem malfunction that results in a series of maintenance task events. These events are those principal tasks necessary to restore the subsystem to operational readiness and to accomplish any necessary repairs of removed LRUs. The maintenance task events consist of one or more maintenance functions or major tasks (e.g., adjust, align, calibrate, troubleshoot, inspect, operate, remove/install, repair, service, etc.). Each flight line maintenance task event and each shop maintenance task event are defined in Appendix A under FLIGHT LINE TASKS and SHOP TASKS, respectively. If further explanation of the terms maintenance action and maintenance event are desired, they are explained in detail in volume one of this report.

II. MODEL LOGIC

This section describes the computer program used to implement the R&M model. It will provide the analyst with an in-depth view of the workings of the program.

Model Input

Initially, data are read into computer storage from the R&M data base files. Detailed descriptions for each input data element contained on the records that constitute the base files are included in Appendix A. These data files are part of an integrated data bank. Verification of the input data for accuracy or completeness can only be made by a comparison of the input data with its raw data source. However, the program is capable of generating certain error messages. Appendix B provides a list of them. Other data problems will result in an immediate halt of the program, usually following a message from the computer system. The input card which caused this type of problem will normally be the last one displayed on the computer printout.

Calculations

The main body of the R&M model generates two matrices plus an additional matrix for each Air Force specialty code (AFSC) of interest. A support equipment (SE) maintenance requirements matrix is also generated. These matrices represent the following:

- MTTR - mean time to repair for each shop and flight line maintenance event is defined and calculated as follows: the probability of occurrence of the task event, given that

there is a failure, multiplied by the maintenance event task time. It should be noted that the maintenance event task time used as the input for this computation is the actual average time it takes to accomplish the event based on historical data; i.e., the input is the mean time to repair per task event without considering the probability of occurrence.

- MMH - maintenance manhours for each shop and flight line task event. This is calculated as MTTR multiplied by the total number of AFSCs required for the event.
- SE maintenance - for each shop test station a matrix is set up to give values for the MTTR, MMH, MMH/1000 FH, and MTTR/1000 FH consumed in test drawer and test station repair for each LRU tested. The ready time of the test station per 1000 operating hours of test time is also calculated in the model.
- For each AFSC designated for analysis, another matrix is set up that displays the MMH/1000 FH consumed for each LRU and subsystem that is maintained. These values are then multiplied by a constant cost factor to show the manhour cost per 1000 flight hours.

Once the single task event/single outcome elements of each matrix have been computed, the program totals across maintenance events (columns) and outcomes (rows) to complete the matrix. These matrices are intermediate products which are the basis for a series of user selected output options.

The flight line inherent availability (A) of each subsystem is also calculated within the model by dividing the mean flight hours between maintenance actions (MFHBMA) by the total of the MFHBMA and the flight line MTTR. This calculation can also be represented as:

$$A = \frac{1}{1 + (\text{MTTR})(\text{PMA})}$$

where $\text{PMA} = \dfrac{1}{\text{MFHBMA}}$,

or the probability of a maintenance action (PMA) per flight hour.

The service flight line availability for the avionics system is then calculated within the model as the product of all of the inherent subsystem availabilities.

Model Output

Subsystem inherent flight line availability is a mandatory output, as is the listing of the input data files which precedes it. All other outputs are user selected as described in Section IV.

Except for the MTTR and MMH matrices (including the MMH/1000 FH required for user selected AFSCs), the remainder of the output is calculated when selected. To display the MTTR as percent of total, each matrix element is divided by one one-hundredth of the total MTTR for that subsystem. MMH as a percent of total is computed in the same manner. MMH per 1000 flight hours (FH) is calculated by dividing each matrix element by one one-thousandth of the MFHBMA. Maintenance index (defined as the MTTR per 1000 FH) is each element of the MTTR matrix divided by one one-thousandth of the MFHBMA, also.

Most outputs can be summed over a group of subsystems for examination at a higher level of aggregation.

Program Flow Chart

The basic flow of execution of the R&M model is shown in Figure 1.

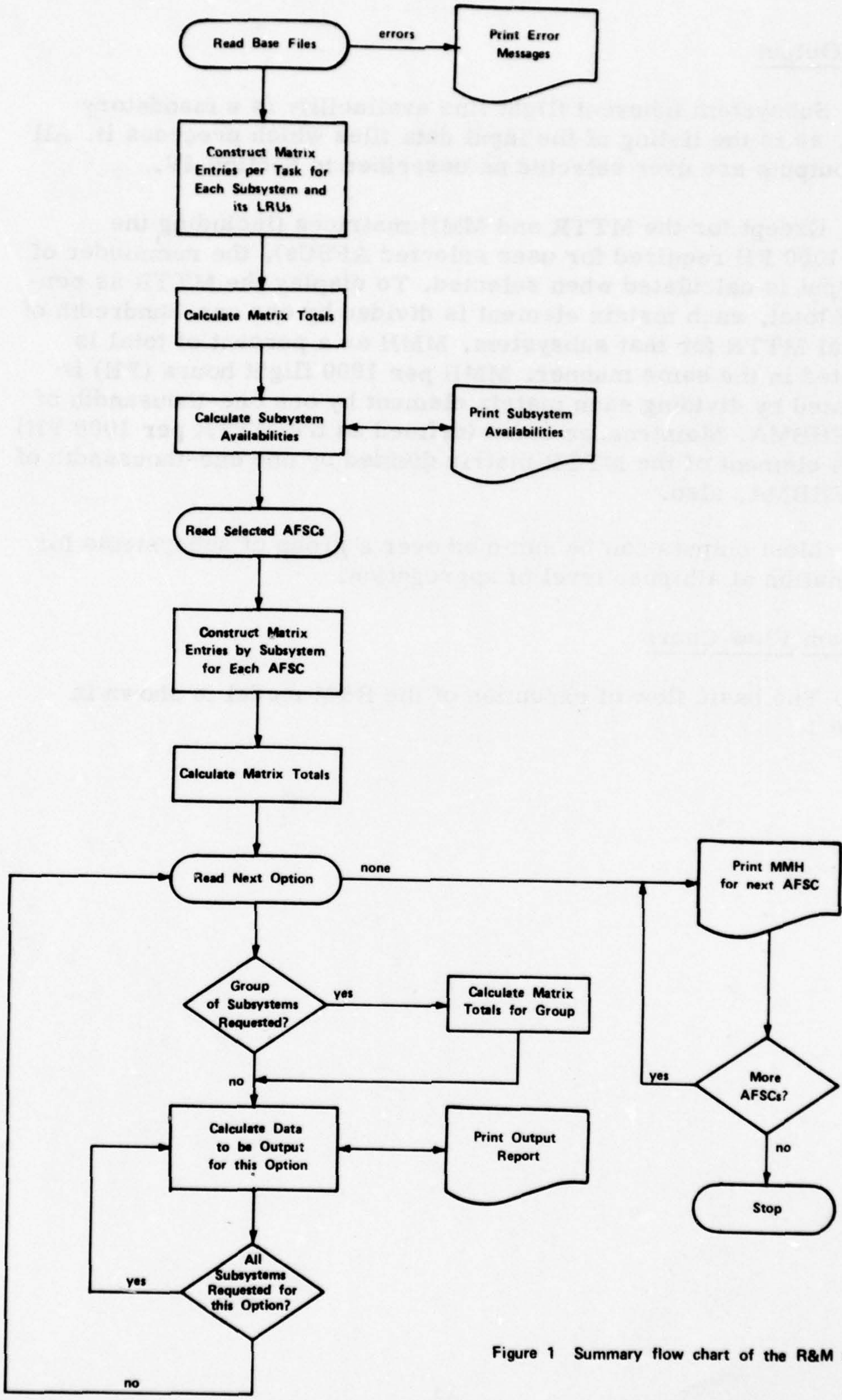

Figure 1 Summary flow chart of the R&M model

III. EXAMPLE RUN

Subsequent sections describe the input forms and output reports of the model. To facilitate this description, an example run has been constructed and is used to illustrate the ways in which the data are input to the model and results displayed on output reports.

The example run consists of an avionics system containing six subsysystems and 14 LRUs. The arrangement of these items in the equipment hierarchy structure for the system is shown in Figure 2. Dashed line boxes represent equipment not represented in the example run.

All of the input data for the example run are given in the sample input data in the next section. The sample data are generally similar to the type of data prepared for operational use of the model.

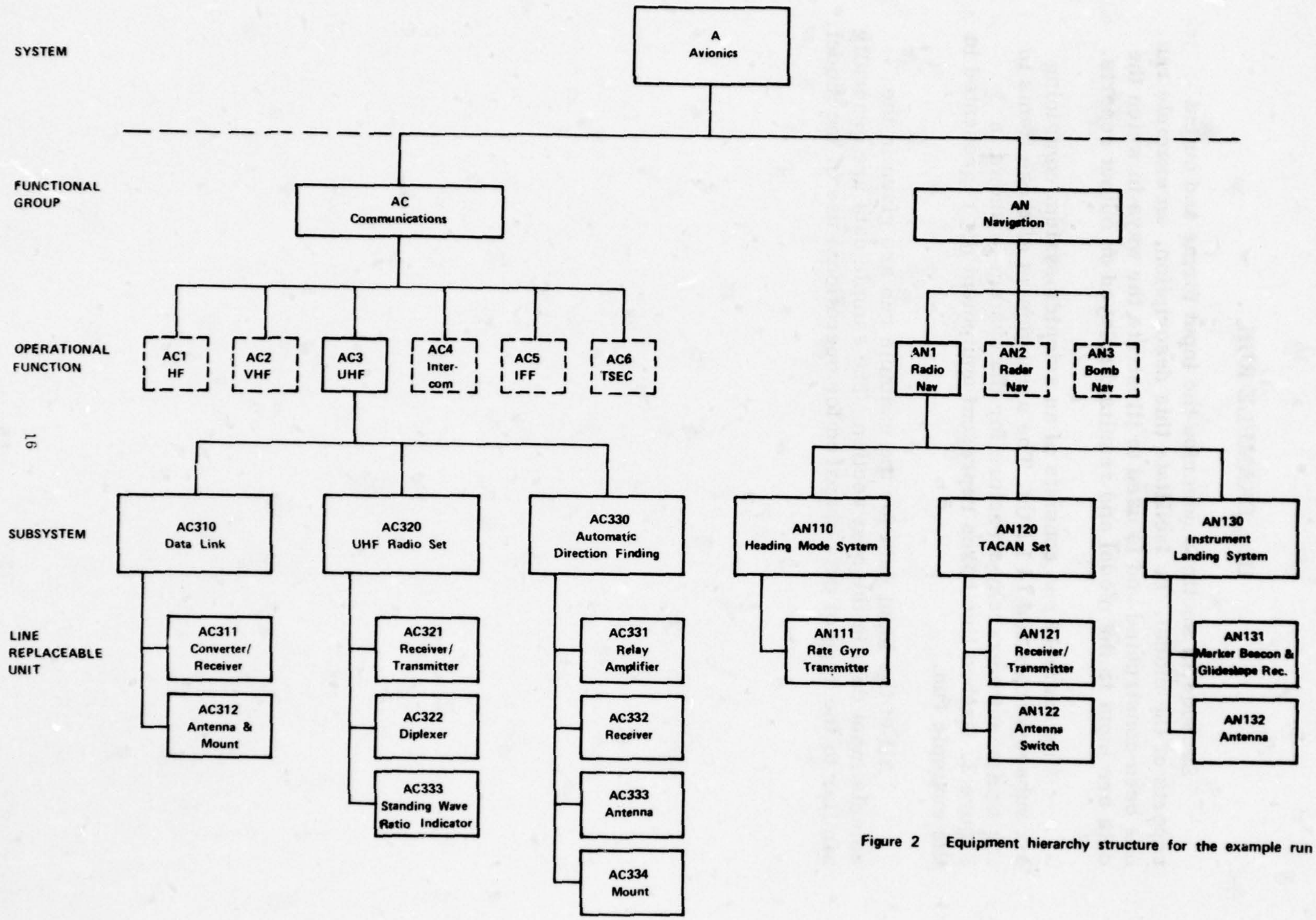

Figure 2 Equipment hierarchy structure for the example run

IV. INPUT FORMATS

Data File Formats

The operation of the R&M model requires that a variety of special input cards be prepared which precisely describe the equipment being analyzed and its logistics support system. There are 13 record card formats. Each contains a particular category of data. A detailed description of the input data elements contained in each field of the individual record cards is included in Appendix A.

The input record card formats, each of which is identified by a two-character code in columns 1 and 2, are described on the following pages. Tables which immediately follow the card type descriptions provide a listing of the data elements contained on each card along with their field format. Each of the tables is preceded by a figure illustrating the input data cards necessary for execution of the example run.

Two cards must precede the input deck. The first card contains the data base title. The second card must contain the number of subsystems to be described punched in columns 1 and 2. (In the example run, which contains six subsystems, a "06" is provided on the second card preceding the input deck.) Each card type must have at least one card for every subsystem/LRU that is input in the cross reference file. The present program allows a number of cards for subsystems and LRUs of 40 and 120, respectively.

Card Type CR - Cross Reference File

The first card type designates the equipment hierarchy structure. This structure is illustrated in Figure 2. The data used in this cross reference file is allocated to two cards noted as a -1 or -2 in column 12, the card sequence column. The second card is a continuation of the first and, when used, contains specific additional information.

CR card number 1 gives the equipment identification (ID) number, LRU weight in pounds, work unit code (WUC), quantity per aircraft (QPA), and the name of the subsystem or LRU. The subsystem CR card also gives the number of LRUs it contains, whereas the LRU CR card gives the number of SRUs that the LRU contains. Card number 2 contains the LRU national stock number (NSN), the AN/nomenclature of the subsystem and LRU, and the manufacturer's part number for the subsystem and LRU. There must be a #1 card for each subsystem and for each LRU, but a #2 card is not mandatory. As pertinent data required by the #2 card are available, they can be used to provide additional identification or reference information. Each card group begins with a subsystem card and is followed by the cards describing the LRUs which belong to it. The formats for CR cards 1 and 2 are shown in Tables 1a and 1b, respectively, and are further described in Appendix A.

A printout of the cards used for the example run are shown in Figure 3. The 06 in columns 1 and 2 of the second card is the "number of subsystems." Note that the same card format is used for both subsystems and LRUs.

```
DAIS THEORETICAL  RELIABILITY AND MAINTAINABILITY MODEL
06
CR  AC310 -1        63510  1 DATA LINK                                        2
CR  AC310 -2        63150                           AN/ASW- 25
CR  AC311 -1   11.8 63511  1 CONVERTER/RECEIVER                               8
CR  AC311 -2        63511                           CV-2230A/ASW-25
CR  AC312 -1    2.0 63515  1 MOUNT & ANTENNA                                  1
CR  AC320 -1        63A00  1 UHF RADIO SET                                    3
CR  AC320 -2        63A00                           AN/ARC- 51BX
CR  AC321 -1   27.7 63AA0  1 RECEIVER/TRANSMITTER (UHF)                       9
CR  AC321 -2        63AA0    5821-00-134-6239       RT-742B/ARC-51BX
CR  AC322 -1    1.0 63AE0  1 DIPLEXER                                         2
CR  AC323 -1    1.1 63AL0  1 STANDING WAVE RATIO INDICATOR                    1
CR  AC323 -2        63AL0    5821-00-978-7867       ID-1003/ARC
CR  AC330 -1        63B00  1 AUTOMATIC DIRECTION FINDING SET - UHF            4
CR  AC330 -2        63B00                           AN/ARA- 50
CR  AC331 -1    5.4 63BA0  1 RELAY AMPLIFIER                                  2
CR  AC331 -2        63BA0    5826-00-059-2726       AM-3624/ARA-50
CR  AC332 -1   10.0 63BB0  1 ANTENNA                                          1
CR  AC332 -2        63BB0    5826-00-849-0055       AS-909/ARA-48
CR  AC333 -1    8.0 63BC0  1 RECEIVER                                         7
CR  AC333 -2        63BC0    5821-00-999-4590-MA R-1286/ARR-69
CR  AC334 -1    1.1 63BF0  1 MOUNT                                            1
CR  AN110 -1        71A00  1 HEADING MODE SYSTEM                              1
CR  AN111 -1    4.0 71AD0  1 RATE GYRO TRANSMITTER                            1
CR  AN120 -1        71B00  1 TACAN SET                                        2
CR  AN120 -2        71B00                           AN/ARN- 52
CR  AN121 -1   43.3 71BA0  1 RECEIVER/TRANSMITTER (TACAN)                     8
CR  AN121 -2        71BA0    5826-00-884-0914       RT-893/ARN-52
CR  AN122 -1    2.3 71BB0  1 ANTENNA SWITCH                                   1
CR  AN130 -1        71C00  1 INSTRUMENT LANDING SYSTEM                        2
CR  AN130 -2        71C00                           AN/ARN- 58A
CR  AN131 -1    8.6 71CA0  1 RADIO MARKER BEACON & GLIDESLOPE REC             6
CR  AN131 -2        71CA     5826-00-226-6030     R-844A/ARN-58A
CR  AN132 -1    4.0 71CC0  1 ANTENNA                                          1
CR  AN132 -2
```

Figure 3. Printout of CR cards with "title" card and "number of subsystems" card for the example run

Table 1a

Field Format of Data Elements Cross Reference File – Card No. 1

Column	Title	Length	Type*	Justification**	Decimal Placement
1 - 2	Card Type - CR	2	A	F	–
3	Blank	1	–	–	–
4	Aircraft System	1	A	F	–
5	Major System	1	A	F	–
6	Functional Group	1	A	F	–
7	Organizational Function	1	N	F	–
8	Subsystem	1	N	F	–
9	Line Replaceable Unit (LRU)	1	X	F	–
10	Shop Replaceable Unit (SRU)	1	N	F	–
11	Dash	1	X	F	–
12	Card Sequence – 1	1	N	F	–
13	Blank	1	–	–	–
14 - 18	LRU Weight–in lbs (col. 17 is a decimal)	5	N	R	1
19	Blank	1	–	–	–
20 - 24	Work Unit Code	5	X	F	–
25	Blank	1	–	–	–
26 - 27	Quantity per Aircraft (QPA)	2	N	R	–
28	Blank	1	–	–	–
29 - 68	Equipment Name	40	A	L	–
69 - 74	Blank	6	–	–	–
75 - 76	No. of LRUs in the Subsystem or SRUs per LRU	2	N	R	–
77 - 80	Blank	4	–	–	–

*A = alpha, N = numeric, X = alpha/numeric

**F = fixed, R = right, L = left

Table 1b

Cross Reference File – Card No. 2

Column	Title	Length	Type*	Justification**	Decimal Placement
1 - 2	Card Type CR	2	A	F	–
3	Blank	1	–	–	–
4	Aircraft System	1	A	F	–
5	Major System	1	A	F	–
6	Functional Group	1	A	F	–
7	Organizational Function	1	N	F	–
8	Subsystem	1	N	F	–
9	Line Replaceable Unit	1	N	F	–
10	Shop Replaceable Unit	1	N	F	–
11	Dash	1	X	F	–
12	Card Sequence – 2	1	N	F	–
13 - 19	Blank	7	–	–	–
20 - 24	Work Unit Code	5	X	F	–
25	Blank	1	–	–	–
26 - 27	Dual Cognizance Code	2	X	F	–
28	Material Contrnl Code	1	X	F	–
29	Dash	1	X	F	–
30 - 33	Federal Supply Classification (NSN)	4	N	F	–
34	Dash	1	X	F	–
35 - 36	Country Code (NSN)	2	N	F	–
37	Blank	1	–	–	–
38 - 40	Federal Item ID No. (NSN)	3	N	F	–
41	Dash	1	X	F	–
42 - 45	Federal Item ID No. cont. (NSN)	4	N	F	–
46	Dash (only when suffix is added)	1	X	F	–
47 - 48	Special Material ID Code (NSN Suffix)	2	A	F	–
49	Blank	1	–	–	–
50 - 52†	AN/	3	X	F	–
53 - 55	AN/No. Alpha Code	3	A	F	–
56	Dash	1	X	F	–
57 - 59	AN/No. Numeric Code	3	N	R	–
60 - 61	AN/No. Alpha Suffix Code	2	A	L	–
62 - 64	Blank	1	–	–	–
65 - 80	Manufacturers Stock Number	15	N	R	–

*A = alpha, N = numeric, X = alpha/numeric

**F = fixed, R = right, L = left

† for LRU part number left justify from column 50

Card Type SF - Support Equipment - Flight Line File

The flight line support equipment cards (SF) identify for the model what special support equipment is needed on the flight line to perform each maintenance task event. One or more SF cards must be supplied for each subsystem, in the format specified in Table 2 and further described in Appendix A.

These cards may be in any order, but placing them in the same order as the CR cards is recommended for more efficient program operation and for ease of editing. If more than one item of support equipment is required for any flight line task event(s) for a particular subsystem, an additional card is used, identifying the additional support equipment in the same field of the second card. Columns 1-11 of the two cards should be the same, with column 12 set at "2" for the second card and "3" for a third. Only the first card of the group requires an entry in columns 56-57, which conveys the total cards for the equipment. If there is only one card, a zero or a one or a blank may be used. The current version of the program allows a maximum of three pieces of support equipment per maintenance event. The cards used for the example run are listed in Figure 4.

	ID#		A	T	CND	R	M	VR	VM
SF	AC310	-1	D60	D60	D60	D60	D60	D60	D60
SF	AC320	-1	D60	D60	D60	D60	D60	D60	D60
SF	AC330	-1	D60	D60	D60	D60	D60	D60	D60
SF	AN110	-1	D60	D60	D60	D60	D60	D60	D60
SF	AN120	-1	D60	D60	D60	D60	D60	D60	D60
SF	AN130	-1	D60	D60	D60	D60	D60	D60	D60

Figure 4. Printout of SF cards for the example run

Table 2

Support Equipment – Flight Line File

Column	Title	Length	Type*	Justification**	Decimal Placement
1 - 2	Card Type – SF	2	A	F	–
3	Blank	1	–	–	–
4	Aircraft System	1	A	F	–
5	Major System	1	A	F	–
6	Functional Group	1	A	F	–
7	Operational Function	1	N	F	–
8	Subsystem	1	N	F	–
9	Line Replaceable Unit	1	X	F	–
10	Shop Replaceable Unit	1	N	F	–
11	Dash	1	X	F	–
12	Card Sequence	1	N	F	–
13	Blank	1	–	–	–
14 - 18	(A) Set Up Support Equipment (SE)	5	N	L	–
19	Blank	1	–	–	–
20 - 24	(T) Troubleshooting SE	5	N	L	–
25	Blank	1	–	–	–
26 - 30	(C) Cannot Duplicate Discrepancy SE	5	N	L	–
31	Blank	1	–	–	–
32 - 36	(R) SE to Remove & Replace (R&R)	5	N	L	–
37	Blank	1	–	–	–
38 - 42	(M) On Aircraft (A/C) Maint. SE	5	N	L	–
43	Blank	1	–	–	–
44 - 48	(V_R) R&R Verification SE	5	N	L	–
49	Blank	11	–	–	–
50 - 54	(V_M) On A/C Maint. Verif. SE	5	N	L	–
55	Blank	1	–	–	–
56 - 57	Maximum No. of SE Per Task	2	N	R	–
58 - 80	Blank	23	–	–	–

*A = alpha, N = numeric, X = alpha/numeric

**F = fixed, R = right, L = left

Card Type LF - Air Force Specialty - Flight Line File

The flight line Air Force specialty (LF) cards identify the manpower by specialty type and skill level that is needed to accomplish each maintenance task event. One or more LF cards must be supplied for each subsystem and should be organized in the same order as the CR cards for more efficient program operation and ease of editing. The current version of the program allows assigning up to five Air Force specialty codes (AFSCs) per task event per equipment. Table 3 gives the card format which is further described in Appendix A. The cards for the example run are listed in Figure 5.

	ID#		A	T	CND	R	M	VR	VM	#
LF	AC310	-1	43171	32833	32853	32833	32853	32853	32853	2
LF	AC310	-2	42153					32833	32833	
LF	AC320	-1	43171	32833	32853	32833	32853	32853	32853	2
LF	AC320	-2	42153		32833		32833			
LF	AC330	-1	43171	32833	32853	32833	32853	32853	32853	2
LF	AC330	-2	42153		32833		32833	32833	32833	
LF	AN110	-1	43171	32831	32851	32831	32851	32851	32851	2
LF	AN110	-2	42153		32831		32831			
LF	AN120	-1	43171	32831	32851	32831	32851	32851	32851	2
LF	AN120	-2	42153		32831		32831			
LF	AN130	-1	43171	32831	32851	32831	32851	32851	32851	2
LF	AN130	-2	42153		32831		32831	32831	32831	

Figure 5. Printout of LF cards for the example run

Table 3

Air Force Specialty — Flight Line File

Column	Title	Length	Type*	Justification**	Decimal Placement
1 - 2	Card Type — LF	2	A	F	—
3	Blank	1	—	—	—
4	Aircraft Sytem	1	A	F	—
5	Major System	1	A	F	—
6	Functional Group	1	A	F	—
7	Operational Function	1	N	F	—
8	Subsystem	1	N	F	—
9	Line Replaceable Unit	1	X	F	—
10	Shop Replaceable Unit	1	N	F	—
11	Dash	1	X	F	—
12	Card Sequence	1	N	F	—
13	Blank	1	—	—	—
14 - 18	(A) AFSC to Set Up Support Equipment	5	N	F	—
19	Blank	1	—	—	—
20 - 24	(T) Troubleshooting AFSC	5	N	F	—
25	Blank	1	—	—	—
26 - 30	(C) Cannot Duplicate Discrepancy AFSC	5	N	F	—
31	Blank	1	—	—	—
32 - 36	(R) AFSC to Remove & Replace (R&R)	5	N	F	—
37	Blank	1	—	—	—
38 - 42	(M) On Aircraft (A/C) Maint. AFSC	5	N	F	—
43	Blank	1	—	—	—
44 - 48	(V_R) R&R Verification AFSC	5	N	F	—
49	Blank	1	—	—	—
50 - 54	(V_M) On A/C Maint. Verif. AFSC	5	N	F	—
55	Blank	1	—	—	—
56 - 57	Maximum No. of AFSCs Per Task	2	N	R	—
58 - 80	Blank	23	—	—	—

*A = alpha, N = numeric, X = alpha/numeric

**F = fixed, R = right, L = left

Card Type LS - Air Force Specialty - Shop File

The shop Air Force specialty (LS) cards, like the flight line LF cards, identify the manpower needed to perform the associated shop tasks. One or more LS cards must be supplied for each LRU accounted for by the CR cards. These cards may be in any order, but placing them in the same order as the CR cards is recommended for more efficient program operation and for ease of editing. The format is found in Table 4 and is further described in Appendix A. A printout of the cards used for the example run are listed in Figure 6.

	ID#	W	K	N	TD	TS	#
LS	AC311 -1	32850	32850	32850	3265A	3265A	2
LS	AC311 -2	32830			3263A	3263A	
LS	AC312 -1	32850		32850			2
LS	AC312 -2	32830					
LS	AC321 -1	32850	32850	32850	3265A	3265A	2
LS	AC321 -2	32830			3263A	3263A	
LS	AC322 -1	32850		32850	3265A	3265A	2
LS	AC322 -2				3263A	3263A	
LS	AC323 -1	32850		32850	3265A	3265A	2
LS	AC323 -2				3263A	3263A	
LS	AC331 -1	32850	32850		3265A	3265A	2
LS	AC331 -2	32830			3263A	3263A	
LS	AC332 -1	32850		32850	3265A	3265A	2
LS	AC332 -2	32830			3263A	3263A	
LS	AC333 -1	32850	32850		3265A	3265A	2
LS	AC333 -2	32830			3263A	3263A	
LS	AC334 -1	32850		32850			2
LS	AC334 -2	32830					
LS	AN111 -1			32651	3265B	3265B	2
LS	AN111 -2				3263B	3265B	
LS	AN121 -1	32850	32850	32850	3265A	3265A	2
LS	AN121 -2	32830			3263A	3263A	
LS	AN122 -1			32850	3265A	3265A	2
LS	AN122 -2				3263A	3263A	
LS	AN131 -1	32850	32850	32850	3265A	3265A	2
LS	AN131 -2	32830			3263A	3263A	
LS	AN132 -1			32850			1

Figure 6. Printout of LS cards for the example run

Table 4

Air Force Specialty – Shop File

Column	Title	Length	Type*	Justification**	Decimal Placement
1 - 2	Card Type - LS	2	A	F	–
3	Blank	1	–	–	–
4	Aircraft System	1	A	F	–
5	Major System	1	A	F	–
6	Functional Group	1	A	F	–
7	Organizational Function	1	N	F	–
8	Subsystem	1	N	F	–
9	Line Replaceable Unit	1	X	F	–
10	Shop Replaceable Unit	1	N	F	–
11	Dash	1	X	F	–
12	Card Sequence	1	N	F	–
13 - 19	Blank	7	–	–	–
20 - 24	(W) Bench Check & Repair AFSC	5	N	F	–
25	Blank	1	–	–	–
26 - 30	(K) Bench Check & CND AFSC	5	N	F	–
31	Blank	1	–	–	–
32 - 36	(N) Bench Check & NRTS AFSC	5	N	F	–
37 - 39	Blank	13	–	–	–
50 - 54	(TD) Test Drawer Repair AFSC	5	N	F	–
55	Blank	1	–	–	–
56 - 60	(TS) Test Station Repair AFSC	5	N	F	–
61	Blank	1	–	–	–
62 - 63	Maximum No. of AFSCs Per Task	2	N	R	–
64 - 80	Blank	17	–	–	–

*A - alpha, N = numeric, X = alpha/numeric

**F = fixed, R = right, L = left

Card Type TS - Task Time - Shop File

The shop task time (TS) cards provide the model with the average time per worker that it takes to accomplish the associated task event. For each LRU, one card of type TS is required to input the shop task event times. These cards may be in any order, but placing them in the same order as the CR cards is recommended for more efficient program operation and for ease of editing. The card format is found in Table 5 and is further described in Appendix A. The cards used for the example run are listed in Figure 7. The time is input in tenths of an hour; e.g., 50 equals 5.0 hours.

	ID#	W	K	N	TD	TS
TS	AC311 -1	28	14	14	12	50
TS	AC312 -1	25		10		
TS	AC321 -1	50	14	13	12	50
TS	AC322 -1	08		10	12	50
TS	AC323 -1	59		07	12	50
TS	AC331 -1	31	28		12	50
TS	AC332 -1	45		35	12	50
TS	AC333 -1	25	14		12	50
TS	AC334 -1	15		06		
TS	AN111 -1			08	12	50
TS	AN121 -1	33	11	20	12	50
TS	AN122 -1			05	12	50
TS	AN131 -1	11	07	17	12	50
TS	AN132 -1			02		

Figure 7. Printout of the TS cards for the example run

Table 5

Task Time – Shop File

Column	Title	Length	Type*	Justification**	Decimal Placement
1 - 2	Card Type – TS	2	A	F	–
3	Blank	1	–	–	–
4	Weapon System	1	A	F	–
5	Major System	1	A	F	–
6	Functional Group	1	A	F	–
7	Operational Function	1	N	F	–
8	Subsystem	1	N	F	–
9	Line Replaceable Unit	1	X	F	–
10	Shop Replaceable Unit	1	N	F	–
11	Dash	1	X	F	–
12	Card Sequence	1	N	F	–
13 - 19	Blank	7	–	–	–
20 - 24	(W) Bench Check & Repair Time	5	N	R	1
25	Blank	1	–	–	–
26 - 30	(K) Bench Check & CND Time	5	N	R	1
31	Blank	1	–	–	–
32 - 36	(N) Bench Check & NRTS Time	5	N	R	1
37 - 49	Blank	13	–	–	–
50 - 54	(TD) Test Drawer Repair Time	5	N	R	1
55	Blank	1	–	–	–
56 - 60	(TS) Test Station Repair Time	5	N	R	1
60 - 80	Blank	20	–	–	–

*A = alpha, N = numeric, X = alpha/numeric

**F = fixed, R = right, L = left

Card Type TF - Task Time - Flight Line File

The flight line task time (TF) cards, like the TS cards, provide the average time, by subsystem, to accomplish the flight line maintenance task events. One card must be provided for each subsystem and organized in the same order as the CR cards for efficient program operation and ease of editing. The card format is provided in Table 6 and further described in Appendix A. The cards used for the example run are listed in Figure 8.

	ID#	A	T	CND	R	M	VR	VM
TF	AC310 -1	02	05	20	15	26	01	01
TF	AC320 -1	02	02	08	14	11	05	05
TF	AC330 -1	02	10	10	10	06	05	05
TF	AN110 -1	02	10	16	15	14	09	09
TF	AN120 -1	02	05	18	10	08	05	02
TF	AN130 -1	02	02	27	10	10	04	02

Figure 8. Printout of TF cards for example run

Table 6

Task Time – Flight Line File

Column	Title	Length	Type*	Justification**	Decimal Placement
1 - 2	Card Type – TF	2	A	F	–
3	Blank	1	–	–	–
4	Aircraft System	1	A	F	–
5	Major System	1	A	F	–
6	Functional Group	1	A	F	–
7	Operational Function	1	N	F	–
8	Subsystem	1	N	F	–
9	Line Replaceable Unit	1	X	F	–
10	Shop Replaceable Unit	1	N	F	–
11	Dash	1	X	F	–
12	Card Sequence	1	N	F	–
13	Blank	1	–	–	–
14 - 18	(A) Time to Set Up Support Equipment	5	N	R	1
19	Blank	1	–	–	–
20 - 24	(T) Troubleshooting Time	5	N	R	1
25	Blank	1	–	–	–
26 - 30	(C) Cannot Duplicate Discrepancy Time	5	N	R	1
31	Blank	1	–	–	–
32 - 36	(R) Time to Remove & Replace (R&R)	5	N	R	1
37	Blank	1	–	–	–
38 - 42	(M) On Aircraft (A/C) Maint. Time	5	N	R	1
43	Blank	1	–	–	–
44 - 48	(V_R) R&R Verification Time	5	N	R	1
49	Blank	1	–	–	–
50 - 54	(V_M) On A/C Maintenance Verif. Time	5	N	R	1
55 - 80	Blank	26	–	–	–

*A = alpha, N = numeric, X = alpha/numeric

**F = fixed, R = right, L = left

Card Type PF - Probability - Flight Line File

The flight line probability (PF) cards provide the probability of occurrence of each flight line maintenance task event. One card of type PF is required for each subsystem. They may be in any order, but placing them in the same order as the CR cards is recommended for more efficient program operation and for ease of editing. The card format is provided in Table 7 and further described in Appendix A. A printout of the cards used in the example run are shown in Figure 9.

	ID#		A	T	CND	R	M	VR	VR
PF	AC310	-1	10000	8800	1200	5280	3520	5280	3520
PF	AC320	-1	10000	8700	1300	7569	1131	7569	1131
PF	AC330	-1	10000	9300	0700	2790	6510	2790	6510
PF	AN110	-1	10000	8600	1400	6280	2320	6280	2320
PF	AN120	-1	10000	9600	0400	8256	1344	8256	1344
PF	AN130	-1	10000	9200	0800	6624	2576	6624	2576

Figure 9. Printout of the PF cards for the example run

Table 7

P Probability – Flight Line File

Column	Title	Length	Type*	Justification**	Decimal Placement
1 - 2	Card Type – PF	2	A	F	–
3	Blank	1	–	–	–
4	Aircraft System	1	A	F	–
5	Major System	1	A	F	–
6	Functional Group	1	A	F	–
7	Operational Function	1	N	F	–
8	Subsystem	1	N	F	–
9	Line Replaceable Unit	1	X	F	–
10	Shop Replaceable Unit	1	N	F	–
11	Dash	1	X	F	–
12	Card Sequence	1	N	F	–
13	Blank	1	–	–	–
14 - 18	P_A – Set Up Support Equipment	5	N	R	4
19	Blank	1	–	–	–
20 - 24	P_T – Troubleshoot	5	N	R	4
25	Blank	1	–	–	–
26 - 30	P_C – Cannot Duplicate Discrepancy	5	N	R	4
31	Blank	1	–	–	–
32 - 36	P_R – Remove & Replace (R&R)	5	N	R	4
37	Blank	1	–	–	–
38 - 42	P_M – On Aircraft (A/C) Maintenance	5	N	R	4
43	Blank	1	–	–	–
44 - 48	PV_R – R&R Verification	5	N	R	4
49	Blank	1	–	–	–
50 - 54	PV_M – On A/C Maintenance Verification	5	N	R	4
55 - 80	Blank	26	–	–	–

*A = alpha, N = numeric, X = alpha/numeric

**F = fixed, R = right, L = left

Card Type PS - Probability - Shop File

The shop probability (PS) cards, like the PF cards, provide the probability of occurrence of each maintenance task event performed on each LRU received in the shop. One card must be provided for each LRU, preferably in the same order as the CR cards to simplify editing and make program operation more efficient. The card format is listed in Table 8 and further described in Appendix A. A printout of the cards used in the example run are shown in Figure 10.

	ID#	W	K	N	TD	TS
PS	AC311 -1	1126	0423	1971	0317	0188
PS	AC312 -1	0880		0880		
PS	AC321 -1	6790	0295	0295	1993	0168
PS	AC322 -1	0076		0009	0020	0003
PS	AC323 -1	0052		0052	0016	0002
PS	AC331 -1	0272	0189		0125	0105
PS	AC332 -1	0216		0438	0124	0017
PS	AC333 -1	0623	0166		0213	0018
PS	AC334 -1	0443		0443		
PS	AN111 -1			6280	1319	0115
PS	AN121 -1	7228	0318	0397	2145	0181
PS	AN122 -1			0313	0059	0008
PS	AN131 -1	5503	0842	0129	1748	0148
PS	AN132 -1			0150		

Figure 10. Printout of the PS cards used for the example run

Table 8

P Probability – Shop File

Column	Title	Length	Type*	Justification**	Decimal Placement
1 - 2	Card Type – PS	2	A	F	–
3	Blank	1	A	F	–
4	Aircraft System	1	A	F	–
5	Major System	1	A	F	–
6	Functional Group	1	A	F	–
7	Organizational Function	1	N	F	–
8	Subsystem	1	N	F	–
9	Line Replaceable Unit	1	X	F	–
10	Shop Replaceable Unit	1	N	F	–
11	Dash	1	X	F	–
12	Card Sequence	1	N	F	–
13 - 19	Blank	7	–	–	–
20 - 24	P_W – Bench Check & Repair	5	N	R	4
25	Blank	1	–	–	–
26 - 30	P_K – Bench Check & RTOK	5	N	R	4
31	Blank	1	–	–	–
32 - 36	P_N – Bench Check & NRTS	5	N	R	4
37 - 49	Blank	13	–	–	–
50 - 54	P_{TD} – Test Drawer Repair	5	N	R	4
55	Blank	1	–	–	–
56 - 60	P_{TS} – Test Station Repair	5	N	R	4
61 - 80	Blank	20	–	–	–

*A = alpha, N = numeric, X = alpha/numeric

**F = fixed, R = right, L = left

Card Type SS - Support Equipment - Shop File

The shop support equipment (SS) cards identify for the model which test station(s) and what drawer number within the station will be used to test each LRU received by the shop for maintenance. The SS card can also be used to list test equipment that would be used to maintain the test station. The current maximum number of test stations per LRU that the model will recognize is two. When a second station is necessary, the data are assigned to a second card with a -2 sequence. At least one card must be assigned to each LRU, preferably in the same order as the CR cards for more efficient program operation and to simplify editing. The format is provided in Table 9 and further described in Appendix A. A printout of the cards used for the example run are shown in Figure 11.

	ID#		W	K	N	TD#	TD	TS	#
SS	AC311	-1	DTS	DTS	DTS	012	DTS		1
SS	AC312	-1				013			0
SS	AC321	-1	CNITM	CNITM	CNITM	014	CNITM		1
SS	AC322	-1	CNITM		CNITM	015	CNITM		1
SS	AC323	-1	CNITM		CNITM	016	CNITM		1
SS	AC331	-1	CNITM	CNITM		017	CNITM		1
SS	AC332	-1	CNITM		CNITM	018	CNITM		1
SS	AC333	-1	CNITM	CNITM		019	CNITM		1
SS	AC334	-1				020			0
SS	AN111	-1			CMPTS	027	CMPTS		1
SS	AN121	-1	CNITM	CNITM	CNITM	028	CNITM		1
SS	AN122	-1			CNITM	029	CNITM		1
SS	AN131	-1	CNITM	CNITM	CNITM	030	CNITM		1
SS	AN132	-1				031			0

Figure 11. Printout of SS cards for the example run

Table 9

Support Equipment (SE) – Shop File

Column	Title	Length	Type*	Justification**	Decimal Placement
1 - 2	Card Type – SS	2	A	F	–
3	Blank	1	–	–	
4	Aircraft System	1	A	F	–
5	Major System	1	A	F	–
6	Functional Group	1	A	F	–
7	Operational Function	1	N	F	–
8	Subsystem	1	N	F	–
9	Line Replaceable Unit	1	X	F	–
10	Shop Replaceable Unit	2	N	F	–
11	Dash	1	X	F	–
12	Card Sequence	1	N	F	–
13 - 19	Blank	7	–	–	–
20 - 24	(W) SE to Bench Check & Repair	5	X	L	–
25	Blank	1	–	–	–
26 - 30	(K) SE to Bench Check & CND	5	X	L	–
31	Blank	1	–	–	–
32 - 36	(N) SE to Bench Check & NRTS	5	X	L	–
37	Blank	1	–	–	–
38 - 40	Test Drawer Number	3	N	R	–
41 - 49	Blank	9	–	–	–
50 - 54	(TD) SE Test Station Under Repair	5	X	L	–
55	Blank	1	–	–	–
56 - 60	(TS) SE to Check Out Test Station	5	X	L	–
61	Blank	1	–	–	–
62 - 63	Maximum No. of SE Per Task	2	N	R	–
64 - 80	Blank	17	–	–	–

*A = alpha, N = numeric, X = alpha/numeric

**F = fixed, R = right, L = left

Card Type MF - Reliability Mean Values - Flight Line File

The flight line reliability mean value (MF) cards contain the mean flight hours between maintenance actions (MFHBMA) for each subsystem. An "H" factor showing the ratio of flight line LRU removals to shop receipts is also provided. The H factor values are input as an additive value greater than unity, and the program adds a one to this value. A further explanation of the H factor is provided in Appendix A for this card type.

There must be one MF card for every subsystem. They may be in any order, but placing them in the same order as the CR cards is recommended for more efficient program operation and for ease of editing. The format is found in Table 10 and further described in Appendix A. A printout of the cards used for the example run are shown in Figure 12. (Note: The example shows zero filled "H" factor" values, but the program does not require this data entry.)

```
      ID#       MFHBMA H.FACTOR

MF   AC310 -1   404.6 0.0000
MF   AC320 -1    62.9 0.0000
MF   AC330 -1   328.1 0.0000
MF   AN110 -1  1031.9 0.0000
MF   AN120 -1    62.9 0.0000
MF   AN130 -1   232.9 0.0000
```

Figure 12. Printout of the MF cards used for the example run

Table 10

Reliability Mean Values – Flight Line File

Column	Title	Length	Type*	Justification**	Decimal Placement
1 - 2	Card Type – MF	2	A	F	–
3	Blank	1	–	–	–
4	Aircraft System	1	A	F	–
5	Major System	1	A	F	–
6	Functional Group	1	A	F	–
7	Operational Function	1	N	F	–
8	Subsystem	1	N	F	–
9	Line Replaceable Unit	1	X	F	–
10	Shop Replaceable Unit	1	N	F	–
11	Dash	1	X	F	–
12	Card Sequence	1	N	F	–
13	Blank	1	–	–	–
14 - 19	Mean Flight Hours Between Maintenance Actions by subsystem (column 18 is a decimal)	6	N	R	1
20	Blank	1	–	–	–
21 - 26	H factor (column 22 is a decimal)	6	N	F	1
27 - 80	Blank	55	–		

*A = alpha, N = numeric, X = alpha/numeric

**F = fixed, R = right, L = left

AFSC Cards - Air Force Specialty Code Definition

All AFSCs which were input in either an "LS" or "LF" input card must be defined here. The first card contains the number of AFSCs punched on the remaining cards. Each succeeding card may contain up to six AFSCs and the respective manhour rates. The AFSCs may be put in any order, and that ordering will be maintained in the AFSC output. If no manhour rate is input, $1 per hour will be used. The format is provided in Table 11. A printout of the cards used for the example run are shown in Figure 13a.

```
016
32251      32231      32651      32631      32652
32632      32850      32830      32851      32831
32853      32833      40451      40431      42153
43171
```

Figure 13a. Printout of AFSC definition cards for example run

SE Cards - Support Equipment Definition

All support equipments which were input in either an "SF" or "SS" input card must be defined here. The first card contains the number of SEs punched on the remaining cards. Each succeeding card contains up to 13 SEs. They may be put in any order, and that ordering will be maintained in the SE output. The format is provided in Table 12. A printout of the cards used for the example run are shown in Figure 13b.

```
06
MWTS   ARFTS CNITM DTS   ICTM  CMPTS
```

Figure 13b. Printout of SE definition cards for the example run

Table 11

AFSC Definition

Column	Title	Length	Type*	Justification**	Decimal Placement
(first card)					
1 - 3	Number of AFSCs	3	N	R	–
(succeeding cards)					
1 - 5	AFSC	5	N	L	–
6 - 11	AFSC manhour cost	6	N	R	2
13 - 17	AFSC	5	N	L	–
18 - 23	AFSC manhour cost	6	N	R	2
25 - 29	AFSC	5	N	L	–
30 - 35	AFSC manhour cost	6	N	R	2
37 - 41	AFSC	5	N	L	–
42 - 47	AFSC manhour cost	6	N	R	2
49 - 53	AFSC	5	N	L	–
54 - 59	AFSC manhour cost	6	N	R	2
61 - 65	AFSC	5	N	L	–
66 - 71	AFSC manhour cost	6	N	R	2
72 - 80	Blank	9	–	–	–

*A = alpha, N = numeric, x = alpha/numeric

**F = fixed, R = right, L = left

Table 12

Support Equipment Definition

Column	Title	Length	Type*	Justification**	Decimal Placement
(first card)					
1 - 2	Number of SEs	2	N	R	–
(succeeding cards)					
1 - 5	SE	5	X	L	–
7 - 11	SE	5	X	L	–
13 - 17	SE	5	X	L	–
19 - 23	SE	5	X	L	–
25 - 29	SE	5	X	L	–
31 - 35	SE	5	X	L	–
37 - 41	SE	5	X	L	–
43 - 47	SE	5	X	L	–
49 - 53	SE	5	X	L	–
55 - 59	SE	5	X	L	–
61 - 65	SE	5	X	L	–
67 - 71	SE	5	X	L	–
73 - 77	SE	5	X	L	–
78 - 80	Blank	3	–	–	–

*A = alpha, N = numeric, X = alpha/numeric

**F = fixed, R = right, L = left

Option Card Formats

Program option cards immediately follow the data file cards of the R&M input deck. These cards are used to generate optional outputs of the model as described below.

AFSCs and SEs of Interest

This option specifies how many Air Force specialty code (AFSC) and support equipment (SE) reports are to be output and then defines them. The first card contains the count and the succeeding cards the AFSC or SE identifications. The format is provided in Table 13. If no AFSC or SE output is desired, a zero is entered in the first card and successive cards are omitted. To reduce the input requirements, the words ALLAF or ALLSE may be used in place of the AFSC or SE identifications to invoke output for all the AFSCs or all of the SEs.

A separate output report will be generated for each AFSC designated. Each report displays, for every subsystem requiring that AFSC, the MMH/1000 FH required for the total shop task events per LRU, the total flight line task events, and the total for the subsystem. An example output matrix is shown in Figure 18. A column of the matrix records the cost/1000 FH for each of these MMH/1000 FH outputs obtained by multiplying by the cost per MMH for that AFSC.

A separate output report of maintenance requirements will be generated for each SE designated. An example output matrix is shown in Figure 17. Each of these reports will provide values for (1) the Test Drawer Repair (TD REP) representing the in-shop repair of the test station drawer (or combination of test equipment) that is needed to test the LRU being checked, (2) the Test Station Repair (TS REP) representing the in-shop repair of the entire test station that is needed to test the LRU being checked and (3) their total. These TD REP, TS REP, and total values are provided for each of the individual LRUs tested on the particular test station and each is given in terms of MTTR, MMH, MMH/1000 FH, and MTTR/1000 FH.

Table 13

AFSC and SE Option Cards

Column	Title	Length	Type*	Justification**	Decimal Placement
(first card)					
1 - 3	Number of AFSCs and SEs requested	3	N	R	–
(succeeding cards)					
1 - 5		5	X	L	–
7 - 11		5	X	L	–
13 - 17		5	X	L	–
19 - 23		5	X	L	–
25 - 29		5	X	L	–
31 - 35	AFSC identification or	5	X	L	–
37 - 41	SE identification or	5	X	L	–
43 - 47	ALLAF or ALLSE	5	X	L	–
49 - 53		5	X	L	–
55 - 59		5	X	L	–
61 - 65		5	X	L	–
67 - 71		5	X	L	–
73 - 77		5	X	L	–
78 - 80		3	–	–	–

*A = alpha, N = numeric, X = alpha/numeric

**F = fixed, R = right, L = left

Subsystem Data Options

The following 13 option cards may occur in any number (or may be omitted) and in any order, with duplications if desired. They serve to call up optional output reports as described below. If none are included, no optional reports will be output. In every case, the subsystem name, or portion thereof, is punched in columns 1-7 and the option number (right-justified) in columns 9-10.

Option #	Title - Description
01	MTTR BY TASK PER LRU - displays mean time to repair for each LRU within the subsystem designated. If the subsystem field is left blank and only the option number is specified, one report will be generated for each subsystem and its LRUs.
02	MTTR AS % OF TOTAL - same as 01 except the values displayed are percentages of the total subsystem MTTR. Only the percentages are displayed.
03	MMH BY TASK PER LRU - displays maintenance manhours for each LRU within the subsystem designated. If the subsystem field is left blank and only the option number is specified, one report will be generated for each subsystem and its LRUs.
04	MMH AS % OF TOTAL - same as 03 except the values displayed are percentages of the total subsystem MMH. Only the percentages are displayed.
05	MMH PER 1000 FH - displays maintenance manhours per thousand flight hours reports for each LRU within the subsystem designated. If the subsystem field is left blank and only the option number is specified, one report will be generated for each subsystem and its LRUs.
06	MAINT INDEX x 1000 - displays the equipment maintainability index defined as MTTR per 1000 flight hours obtained from the equation (MTTR x 1000)/MFHBMA. If the subsystem field is left blank, one report will be generated for each subsystem and its LRUs.

Options 07 through 12 are similar to options 01 through 06, respectively, with the following two exceptions which apply to each option:

a) Only the bottom line total is given for each report rather than itemizing by LRU

b) Rather than each report representing outcomes of maintenance actions for a single subsystem, each can be stipulated to represent a summation over several subsystems as selected by the portion of the subsystem ID number punched in columns 1-7.

These exceptions can be noted in the example run, whereby "AC3" was used as the operational function group ID for options 07 through 12. All subsystems beginning with "AC3" are then used in the summation. Any number of characters may be used as the portion of the subsystem ID. This makes possible the selection of outputs for any hierarchical grouping of subsystems desired. This relationship of ID number to hierarchical order of the equipment is illustrated in Figure 2.

Option #	Title - Description
13	MTTR for All Subsystems and MMH for All Subsystems - this option requires no entry in the subsystem field (columns 1-7) and produces two reports summing the MTTR and MMH for all subsystems.

Figure 14 shows the input option cards which immediately follow the input data file cards. This set of option cards was used in the example run to generate the sample output reports used in this report.

```
002
ALLAF ALLSE
         13
         01
  AC320  02
         03
  AC320  04
         05
         06
  AC3    07
  AC3    08
  AC3    09
  AC3    10
  AC3    11
  AC3    12
```

Figure 14. Printout of input options cards for the example run

V. OUTPUT REPORTS

Structure of the Example Run

The R&M model is capable of providing the user with up to 16 output reports. In addition, a complete listing of the R&M input data is printed out for verification by the user. Figure 15 is a printout of the data used for the example run; complete instructions for its preparation have been provided in Section IV and Appendix A of this volume. Figure 16 displays the first report printed when the R&M model batch program is run. It is the "Subsystem Inherent Flight Line Availability" report which displays this parameter for all subsystems ranked by order of magnitude. This report is always printed first and is not optionally controlled.

Samples of the support equipment (SE) matrices (Figure 17) and AFSC matrices (Figure 18) were selected from the set requested on the option cards previously shown in Figure 14. One report matrix for each requested SE and AFSC is produces when the R&M model is run. Formats for these reports are described on page 43.

Optional output reports 01 through 13 are printed next (Figures 19 through 32) in the order they were requested (Figure 14). The format of these output reports is similarly structured. Briefly, the first line of the report names the value computed and the terms of the computation. The second line provides the subsystem identification (ID) number, work unit code (WUC) in parentheses, equipment name, and the mean flight hours between maintenance action value for the specified subsystem. The third line provides the user with the column headings that describe the data elements contained in the output matrices for each maintenance event.

The column titles are:

AGE F/L	setup support equipment event on the flight line
TS F/L	troubleshooting event on the flight line
R&R	remove and replace event
VR&R	verification event of removal and replacement
CND A/C	troubleshooting event on the aircraft, cannot duplicate the discrepancy

M A/C	minor maintenance on aircraft event
VM A/C	verification event, that the maintenance performed corrected the discrepancy
SHOP	bench check, test, and repair events of units removed to the shop
TOT/OUT	total per outcome

The fourth line provides the line replaceable unit (LRU), ID number, WUC, and equipment name, which is repeated for each set of LRU data displayed.

Descriptions of lines two and four apply only to report options 01 through 06.

The rows of data that follow these headings contain the computed values broken out by task event for each of the following maintenance action outcomes:

W	bench check and repair outcome
K	bench tested and found serviceable outcome (no maintenance required)
N	not repairable this station (NRTS) outcome which is a return to depot for repair
SUB	subtotal for the shop tasks required for the LRU
CND	cannot duplicate the discrepancy outcome
TOT/TSK	total for the task

For detailed descriptions of the output reports, including equations, definitions, and example calculations the user should reference Section IV of AFHRL-TR-78-2(I), the companion technical report to this user's guide.

```
DAIS THEORETICAL  RELIABILITY AND MAINTAINABILITY MODEL
06
CR  AC310 -1       63510  1 DATA LINK                                          2
CR  AC310 -2       63150                              AN/ASW- 25
CR  AC311 -1  11.8 63511  1 CONVERTER/RECEIVER                                 8
CR  AC311 -2       63511                              CV-2230A/ASW-25
CR  AC312 -1   2.0 63515  1 MOUNT & ANTENNA                                    1
CR  AC320 -1       63A00  1 UHF RADIO SET                                      3
CR  AC320 -2       63A00                              AN/ARC- 51BX
CR  AC321 -1  27.7 63AA0  1 RECEIVER/TRANSMITTER (UHF)                         9
CR  AC321 -2       63AA0    5821-00-134-6239      RT-742B/ARC-51BX
CR  AC322 -1   1.0 63AE0  1 DIPLEXER                                           2
CR  AC323 -1   1.1 63AL0  1 STANDING WAVE RATIO INDICATOR                      1
CR  AC323 -2       63AL0    5821-00-978-7867      ID-1003/ARC
CR  AC330 -1       63B00  1 AUTOMATIC DIRECTION FINDING SET - UHF              4
CR  AC330 -2       63B00                              AN/ARA- 50
CR  AC331 -1   5.4 63BA0  1 RELAY AMPLIFIER                                    2
CR  AC331 -2       63BA0    5826-00-059-2726      AM-3624/ARA-50
CR  AC332 -1  10.0 63BB0  1 ANTENNA                                            1
CR  AC332 -2       63BB0    5826-00-849-0055      AS-909/ARA-48
CR  AC333 -1   8.0 63BC0  1 RECEIVER                                           7
CR  AC333 -2       63BC0    5821-00-999-4590-MA R-1286/ARR-69
CR  AC334 -1   1.1 63BF0  1 MOUNT                                              1
CR  AN110 -1       71A00  1 HEADING MODE SYSTEM                                1
CR  AN111 -1   4.0 71AD0  1 RATE GYRO TRANSMITTER                              1
CR  AN120 -1       71B00  1 TACAN SET                                          2
CR  AN120 -2       71B00                              AN/ARN- 52
CR  AN121 -1  43.3 71BA0  1 RECEIVER/TRANSMITTER (TACAN)                       8
CR  AN121 -2       71BA0    5826-00-884-0914      RT-893/ARN-52
CR  AN122 -1   2.3 71BB0  1 ANTENNA SWITCH                                     1
```

Figure 15. Input data records

```
CR  AN130 -1      71C00  1 INSTRUMENT LANDING SYSTEM                 2
CR  AN130 -2      71C00                           AN/ARN- 58A
CR  AN131 -1   8.6 71CA0  1 RADIO MARKER BEACON & GLIDESLOPE REC      6
CR  AN131 -2      71CA     5826-00-226-6030    R-844A/ARN-58A
CR  AN132 -1   4.0 71CC0  1 ANTENNA                                   1
CR  AN132 -2
SF  AC310 -1 D60   D60   D60   D60   D60   D60   D60
SF  AC320 -1 D60   D60   D60   D60   D60   D60   D60
SF  AC330 -1 D60   D60   D60   D60   D60   D60   D60
SF  AN110 -1 D60   D60   D60   D60   D60   D60   D60
SF  AN120 -1 D60   D60   D60   D60   D60   D60   D60
SF  AN130 -1 D60   D60   D60   D60   D60   D60   D60
LF  AC310 -1 43171 32833 32853 32833 32853 32853 32853  2
LF  AC310 -2 42153                         32833 32833
LF  AC320 -1 43171 32833 32853 32833 32853 32853 32853  2
LF  AC320 -2 42153       32833       32833
LF  AC330 -1 43171 32833 32853 32833 32853 32853 32853  2
LF  AC330 -2 42153       32833       32833 32833 32833
LF  AN110 -1 43171 32831 32851 32831 32851 32851 32851  2
LF  AN110 -2 42153       32831       32831
LF  AN120 -1 43171 32831 32851 32831 32851 32851 32851  2
LF  AN120 -2 42153       32831       32831
LF  AN130 -1 43171 32831 32851 32831 32851 32851 32851  2
LF  AN130 -2 42153       32831       32831 32831 32831
LS  AC311 -1       32850 32850 32850             3265A 3265A  2
LS  AC311 -2       32830                         3263A 3263A
LS  AC312 -1       32850       32850                          2
LS  AC312 -2       32830
LS  AC321 -1       32850 32850 32850             3265A 3265A  2
LS  AC321 -2       32830                         3263A 3263A
```

Figure 15. (continued)

LS	AC322	-1	32850		32850	3265A	3265A	2
LS	AC322	-2				3263A	3263A	
LS	AC323	-1	32850		32850	3265A	3265A	2
LS	AC323	-2				3263A	3263A	
LS	AC331	-1	32850	32850		3265A	3265A	2
LS	AC331	-2	32830			3263A	3263A	
LS	AC332	-1	32850		32850	3265A	3265A	2
LS	AC332	-2	32830			3263A	3263A	
LS	AC333	-1	32850	32850		3265A	3265A	2
LS	AC333	-2	32830			3263A	3263A	
LS	AC334	-1	32850		32850			2
LS	AC334	-2	32830					
LS	AN111	-1			32651	3265B	3265B	2
LS	AN111	-2				3263B	3265B	
LS	AN121	-1	32850	32850	32850	3265A	3265A	2
LS	AN121	-2	32830			3263A	3263A	
LS	AN122	-1			32850	3265A	3265A	2
LS	AN122	-2				3263A	3263A	
LS	AN131	-1	32850	32850	32850	3265A	3265A	2
LS	AN131	-2	32830			3263A	3263A	
LS	AN132	-1			32850			1
TS	AC311	-1	28	14	14	12	50	
TS	AC312	-1	25		10			
TS	AC321	-1	50	14	13	12	50	
TS	AC322	-1	08		10	12	50	
TS	AC323	-1	59		07	12	50	
TS	AC331	-1	31	28		12	50	
TS	AC332	-1	45		35	12	50	
TS	AC333	-1	25	14		12	50	
TS	AC334	-1	15		06			

Figure 15. (continued)

TS	AN111	-1				08			12	50
TS	AN121	-1		33	11	20			12	50
TS	AN122	-1				05			12	50
TS	AN131	-1		11	07	17			12	50
TS	AN132	-1				02				
TF	AC310	-1	02	05	20	15	26	01	01	
TF	AC320	-1	02	02	08	14	11	05	05	
TF	AC330	-1	02	10	10	10	06	05	05	
TF	AN110	-1	02	10	16	15	14	09	09	
TF	AN120	-1	02	05	18	10	08	05	02	
TF	AN130	-1	02	02	27	10	10	04	02	
PF	AC310	-1	10000	8800	1200	5280	3520	5280	3520	
PF	AC320	-1	10000	8700	1300	7569	1131	7569	1131	
PF	AC330	-1	10000	9300	0700	2790	6510	2790	6510	
PF	AN110	-1	10000	8600	1400	6280	2320	6280	2320	
PF	AN120	-1	10000	9600	0400	8256	1344	8256	1344	
PF	AN130	-1	10000	9200	0800	6624	2576	6624	2576	
PS	AC311	-1		1126	0423	1971			0317	0188
PS	AC312	-1		0880		0880				
PS	AC321	-1		6790	0295	0295			1993	0168
PS	AC322	-1		0076		0009			0020	0003
PS	AC323	-1		0052		0052			0016	0002
PS	AC331	-1		0272	0189				0125	0105
PS	AC332	-1		0216		0438			0124	0017
PS	AC333	-1		0623	0166				0213	0018
PS	AC334	-1		0443		0443				
PS	AN111	-1				6280			1319	0115
PS	AN121	-1		7228	0318	0397			2145	0181
PS	AN122	-1				0313			0059	0008
PS	AN131	-1		5503	0842	0129			1748	0148

Figure 15. (continued)

```
PS  AN132 -1                       0150
SS  AC311 -1        DTS   DTS   DTS   012           DTS        1
SS  AC312 -1                          013                      0
SS  AC321 -1        CNITM CNITM CNITM 014           CNITM      1
SS  AC322 -1        CNITM       CNITM 015           CNITM      1
SS  AC323 -1        CNITM       CNITM 016           CNITM      1
SS  AC331 -1        CNITM CNITM       017           CNITM      1
SS  AC332 -1        CNITM       CNITM 018           CNITM      1
SS  AC333 -1        CNITM CNITM       019           CNITM      1
SS  AC334 -1                          020                      0
SS  AN111 -1                    CMPTS 027           CMPTS      1
SS  AN121 -1        CNITM CNITM CNITM 028           CNITM      1
SS  AN122 -1                    CNITM 029           CNITM      1
SS  AN131 -1        CNITM CNITM CNITM 030           CNITM      1
SS  AN132 -1                          031                      0
MF  AC310 -1  404.6 0.0000
MF  AC320 -1   62.9 0.0000
MF  AC330 -1  328.1 0.0000
MF  AN110 -1 1031.9 0.0000
MF  AN120 -1   62.9 0.0000
MF  AN130 -1  232.9 0.0000
016
32251     32231     32651     32631     32652
32632     32850     32830     32851     32831
32853     32833     40451     40431     42153
43171
06
MWTS  ARFTS CNITM DTS   ICTM  CMPTS
```

Figure 15. (continued)

SUBSYSTEM INHERENT FLIGHT LINE AVAILABILITY

SUBSYSTEM	AVAILABILITY
AN120	0.9673
AC320	0.9677
AN130	0.9922
AC330	0.9929
AC310	0.9934
AN110	0.9968

SERVICE FLIGHT LINE AVAILABILITY-
0.9132

Figure 16. Sample availability report

SE-CNITM	TD#	-MTTR-			-MMH-			-MMH/1000 FH-			-MTTR/1000 FH-		
		TD REP	TS REP	TOTAL	TD REP	TS REP	TOTAL	TD REP	TS REP	TOTAL	TD REP	TS REP	TOTAL
AC111	6	0.0823	0.0210	0.1033	0.1646	0.0420	0.2066	3.2282	0.8235	4.0518	1.6141	0.4118	2.0259
AC112	7	0.0490	0.0270	0.0760	0.0979	0.0540	0.1519	1.9200	1.0588	2.9788	0.9600	0.5294	1.4894
AC113	8	0.0154	0.0085	0.0239	0.0307	0.0170	0.0477	0.6024	0.3333	0.9357	0.3012	0.1667	0.4678
AC114	9	0.0162	0.0090	0.0252	0.0324	0.0180	0.0504	0.6353	0.3529	0.9882	0.3176	0.1765	0.4941
AC110		0.1628	0.0655	0.2283	0.3257	0.1310	0.4567	6.3859	2.5686	8.9545	3.1929	1.2843	4.4773
AC211	10	0.1777	0.0625	0.2402	0.3554	0.1250	0.4804	4.7519	1.6711	6.4230	2.3759	0.8356	3.2115
AC212	11	0.0028	0.0015	0.0043	0.0055	0.0030	0.0085	0.0738	0.0401	0.1139	0.0369	0.0201	0.0570
AC210		0.1805	0.0640	0.2445	0.3610	0.1280	0.4890	4.8257	1.7112	6.5369	2.4128	0.8556	3.2684
AC311	12	0.0380	0.0940	0.1320	0.0761	0.1880	0.2641	0.1880	0.4647	0.6527	0.0940	0.2323	0.3263
AC310		0.0380	0.0940	0.1320	0.0761	0.1880	0.2641	0.1880	0.4647	0.6527	0.0940	0.2323	0.3263
AC321	14	0.2392	0.0840	0.3232	0.4783	0.1680	0.6463	7.6045	2.6709	10.2754	3.8022	1.3355	5.1377
AC322	15	0.0024	0.0015	0.0039	0.0048	0.0030	0.0078	0.0763	0.0477	0.1240	0.0382	0.0238	0.0620
AC323	16	0.0019	0.0010	0.0029	0.0038	0.0020	0.0058	0.0610	0.0318	0.0928	0.0305	0.0159	0.0464
AC320		0.2435	0.0865	0.3300	0.4870	0.1730	0.6600	7.7418	2.7504	10.4922	3.8709	1.3752	5.2461
AC331	17	0.0150	0.0525	0.0675	0.0300	0.1050	0.1350	0.0914	0.3200	0.4115	0.0457	0.1600	0.2057
AC332	18	0.0149	0.0085	0.0234	0.0298	0.0170	0.0468	0.0907	0.0518	0.1425	0.0454	0.0259	0.0713
AC333	19	0.0256	0.0090	0.0346	0.0511	0.0180	0.0691	0.1558	0.0549	0.2107	0.0779	0.0274	0.1053
AC330		0.0554	0.0700	0.1254	0.1109	0.1400	0.2509	0.3379	0.4267	0.7646	0.1690	0.2133	0.3823
AC411	21	0.0416	0.0040	0.0456	0.0833	0.0080	0.0913	0.5559	0.0534	0.6093	0.2780	0.0267	0.3047
AC412	22	0.0316	0.0030	0.0346	0.0631	0.0060	0.0691	0.4214	0.0401	0.4614	0.2107	0.0200	0.2307
AC413	23	0.0132	0.0010	0.0142	0.0264	0.0020	0.0284	0.1762	0.0134	0.1896	0.0881	0.0067	0.0948
AC410		0.0864	0.0080	0.0944	0.1728	0.0160	0.1888	1.1535	0.1068	1.2603	0.5768	0.0534	0.6302
AC511	24	0.2777	0.0700	0.3477	0.5554	0.1400	0.6954	0.8574	0.2161	1.0736	0.4287	0.1081	0.5368
AC510		0.2777	0.0700	0.3477	0.5554	0.1400	0.6954	0.8574	0.2161	1.0736	0.4287	0.1081	0.5368
AC611	25	0.1643	0.0415	0.2058	0.3286	0.0830	0.4116	2.7221	0.6877	3.4098	1.3611	0.3438	1.7049
AC612	26	0.0035	0.0020	0.0055	0.0070	0.0040	0.0110	0.0577	0.0331	0.0908	0.0288	0.0166	0.0454
AC610		0.1678	0.0435	0.2113	0.3355	0.0870	0.4225	2.7798	0.7208	3.5006	1.3899	0.3604	1.7503
AN121	28	0.2574	0.0905	0.3479	0.5148	0.1810	0.6958	8.1844	2.8776	11.0620	4.0922	1.4388	5.5310
AN122	29	0.0071	0.0040	0.0111	0.0142	0.0080	0.0222	0.2251	0.1272	0.3523	0.1126	0.0636	0.1762
AN120		0.2645	0.0945	0.3590	0.5290	0.1890	0.7180	8.4095	3.0048	11.4143	4.2048	1.5024	5.7072
AN131	30	0.2098	0.0740	0.2838	0.4195	0.1480	0.5675	1.8013	0.6355	2.4368	0.9006	0.3177	1.2184
AN130		0.2098	0.0740	0.2838	0.4195	0.1480	0.5675	1.8013	0.6355	2.4368	0.9006	0.3177	1.2184
AN211	32	0.2448	0.0860	0.3308	0.4896	0.1720	0.6616	9.0000	3.1618	12.1618	4.5000	1.5809	6.0809
AN213	34	0.0128	0.0070	0.0198	0.0257	0.0140	0.0397	0.4721	0.2574	0.7294	0.2360	0.1287	0.3647
AN210		0.2576	0.0930	0.3506	0.5153	0.1860	0.7013	9.4721	3.4191	12.8912	4.7360	1.7096	6.4456
TOTAL		1.9440	0.7630	2.7070	3.8880	1.5260	5.4140	43.9530	16.0247	59.9777	21.9765	8.0124	29.9889

Figure 17. Sample SE maintenance requirements report

AFSC-32830 $ 1.00

	MMH/KFH	COST/KFH
	-------	-------
AC111	13.43961	13.43961
AC112	18.18980	18.18980
AC113	3.96471	3.96471
AC114	6.00549	6.00549
FL	0.	0.
	-------	-------
AC110	41.59961	41.59961
AC211	23.18182	23.18182
AC212	0.26310	0.26310
FL	0.	0.
	-------	-------
AC210	23.44492	23.44492
AC311	0.77924	0.77924
AC312	0.54375	0.54375
FL	0.	0.
	-------	-------
AC310	1.32299	1.32299
AC321	53.97456	53.97456
FL	0.	0.
	-------	-------
AC320	53.97456	53.97456
AC331	0.25699	0.25699
AC332	0.29625	0.29625
AC333	0.47470	0.47470
AC334	0.20253	0.20253
FL	0.	0.
	-------	-------
AC330	1.23048	1.23048
AC411	1.93565	1.93565
FL	0.	0.
	-------	-------
AC410	1.93565	1.93565
AC511	2.03008	2.03008
FL	0.	0.
	-------	-------
AC510	2.03008	2.03008
AC612	0.12759	0.12759
FL	0.	0.
	-------	-------
AC610	0.12759	0.12759
AN121	37.92114	37.92114
FL	0.	0.
	-------	-------
AN120	37.92114	37.92114
AN131	2.59910	2.59910
FL	0.	0.
	-------	-------
AN130	2.59910	2.59910
AN211	39.04779	39.04779
FL	0.	0.
	-------	-------
AN210	39.04779	39.04779
	-------	-------
TOTAL	205.23391	205.23391

Figure 18. Sample manpower report

MTTR FOR ALL SUBSYSTEMS

SUBSYS	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
AC310	0.2000	0.4460	0.7919	0.0528	0.2400	0.9152	0.0352	0.9583	3.6333
AC320	0.2000	0.1740	1.0599	0.3785	0.1040	0.1244	0.0566	3.5306	5.6281
AC330	0.2000	0.9200	0.2790	0.1395	0.0700	0.3906	0.3255	0.6598	2.9944
AN110	0.2000	0.8600	0.9420	0.5652	0.2240	0.3248	0.2088	0.5024	3.8272
AN120	0.2000	0.4800	0.8256	0.4128	0.0720	0.1075	0.0269	2.5153	4.6401
AN130	0.2000	0.1840	0.6624	0.2650	0.2160	0.2576	0.0515	0.6892	2.5257
TOTAL	1.2000	3.0680	4.5608	1.8138	0.9260	2.1201	0.7045	8.8555	23.2487

Figure 19. Sample option 13 report (part 1)

MMH FOR ALL SUBSYSTEMS

SUBSYS	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
AC310	0.4000	0.4400	0.7919	0.1056	0.2400	0.9152	0.0704	1.4936	4.4565
AC320	0.4001	0.1740	1.0599	0.3785	0.2080	0.1244	0.1131	6.9261	9.3842
AC330	0.4000	0.9380	0.2790	0.2790	0.1400	0.7812	0.6510	1.0635	4.5237
AN110	0.4000	0.8600	0.9420	0.5652	0.4480	0.6496	0.2088	0.5024	4.5760
AN120	0.4000	0.4800	0.8256	0.4128	0.1440	0.2150	0.0269	4.9005	7.4048
AN130	0.4000	0.1840	0.6624	0.5299	0.4320	0.5152	0.1030	1.2945	4.1211
TOTAL	2.4000	3.0680	4.5608	2.2711	1.6120	3.2007	1.1732	16.1806	34.4663

Figure 20. Sample option 13 report (part 2)

MTTR BY TASK PER LRU

SUBSYSTEM- AC320 (63A00) UHF RADIO SET MFHBMA= 62.9

	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
LRU- AC321	(63AA0)		RECEIVER/TRANSMITTER (UHF)						
W	0.13580	0.13580	0.95060	0.33950				3.39500	4.95670
K	0.00590	0.00590	0.04130	0.01475				0.04130	0.10915
N	0.00590	0.00590	0.04130	0.01475				0.03835	0.10620
SUB	0.14760	0.14760	1.03320	0.36900				3.47465	5.17205
LRU- AC322	(63AE0)		DIPLEXER						
W	0.00158	0.00158	0.01106	0.00395				0.00632	0.02449
K	0.	0.	0.	0.				0.	0.
N	0.00018	0.00018	0.00126	0.00045				0.00090	0.00297
SUB	0.00176	0.00176	0.01232	0.00440				0.00722	0.02746
LRU- AC323	(53AL0)		STANDING WAVE RATIO INDICATOR						
W	0.00104	0.00104	0.00728	0.00260				0.03068	0.04264
K	0.	0.	0.	0.				0.	0.
N	0.00104	0.00104	0.00728	0.00260				0.00364	0.01560
SUB	0.00208	0.00208	0.01456	0.00520				0.03432	0.05824
CND	0.02600				0.10400				0.13000
M	0.02262	0.02262				0.12441	0.05655		0.22620
TOT/TSK	0.20006	0.17406	1.06008	0.37860	0.10400	0.12441	0.05655	3.51619	5.61395

Figure 21. Sample option 01 report

MTTR AS % OF TOTAL

SUBSYSTEM- AC320 (63A00) UHF RADIO SET MFHBMA= 62.9

	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
LRU- AC321 (63AA0) RECEIVER/TRANSMITTER (UHF)									
W	2.419	2.419	16.933	6.047				60.474	88.293
K	0.105	0.105	0.736	0.263				0.736	1.944
N	0.105	0.105	0.736	0.263				0.683	1.892
SUB	2.629	2.629	18.404	6.573				61.893	92.129
LRU- AC322 (63AE0) DIPLEXER									
W	0.028	0.028	0.197	0.070				0.113	0.436
K	0.	0.	0.	0.				0.	0.
N	0.003	0.003	0.022	0.008				0.016	0.053
SUB	0.031	0.031	0.219	0.078				0.129	0.489
LRU- AC323 (63AL0) STANDING WAVE RATIO INDICATOR									
W	0.019	0.019	0.130	0.046				0.546	0.760
K	0.	0.	0.	0.				0.	0.
N	0.019	0.019	0.130	0.046				0.065	0.278
SUB	0.037	0.037	0.259	0.093				0.611	1.037
CND	0.463				1.853				2.316
M	0.403	0.403				2.216	1.007		4.029
TOT/TSK	3.564	3.100	18.883	6.744	1.853	2.216	1.007	62.633	100.000

Figure 22. Sample option 02 report

MMH BY TASK PER LRU

SUBSYSTEM- AC320 (63A00) UHF RADIO SET MFHBMA= 62.9

	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
LRU- AC321 (63AA0) RECEIVER/TRANSMITTER (UHF)									
W	0.27160	0.13580	0.95060	0.33950				6.79000	8.48750
K	0.01180	0.00590	0.04130	0.01475				0.04130	0.11505
N	0.01180	0.00590	0.04130	0.01475				0.03835	0.11210
SUB	0.29520	0.14760	1.03320	0.36900				6.86965	8.71465
LRU- AC322 (63AE0) DIPLEXER									
W	0.00316	0.00158	0.01106	0.00395				0.00632	0.02607
K	0.	0.	0.	0.				0.	0.
N	0.00036	0.00018	0.00126	0.00045				0.00090	0.00315
SUB	0.00352	0.00176	0.01232	0.00440				0.00722	0.02922
LRU- AC323 (63AL0) STANDING WAVE RATIO INDICATOR									
W	0.00208	0.00104	0.00728	0.00260				0.03068	0.04368
K	0.	0.	0.	0.				0.	0.
N	0.00208	0.00104	0.00728	0.00260				0.00364	0.01664
SUB	0.00416	0.00208	0.01456	0.00520				0.03432	0.06032
CND	0.05200				0.20800				0.26000
M	0.04524	0.02262				0.24882	0.05655		0.37323
TOT/TSK	0.40012	0.17406	1.06008	0.37860	0.20800	0.24882	0.05655	6.91119	9.43742

Figure 23. Sample option 03 report

MMH AS % OF TOTAL

SUBSYSTEM- AC320 (63A00) UHF RADIO SET MFHBMA= 62.9

	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
LRU- AC321 (63AA0) RECEIVER/TRANSMITTER (UHF)									
W	2.878	1.439	10.073	3.597				71.948	89.935
K	0.125	0.063	0.438	0.156				0.438	1.219
N	0.125	0.063	0.438	0.156				0.406	1.188
SUB	3.128	1.564	10.948	3.910				72.792	92.341
LRU- AC322 (63AE0) DIPLEXER									
W	0.033	0.017	0.117	0.042				0.067	0.276
K	0.	0.	0.	0.				0.	0.
N	0.004	0.002	0.013	0.005				0.010	0.033
SUB	0.037	0.019	0.131	0.047				0.077	0.310
LRU- AC323 (63AL0) STANDING WAVE RATIO INDICATOR									
W	0.022	0.011	0.077	0.028				0.325	0.463
K	0.	0.	0.	0.				0.	0.
N	0.022	0.011	0.077	0.028				0.039	0.176
SUB	0.044	0.022	0.154	0.055				0.364	0.639
CND	0.551				2.204				2.755
M	0.479	0.240				2.637	0.599		3.955
TOT/TSK	4.240	1.844	11.233	4.012	2.204	2.637	0.599	73.232	100.000

Figure 24. Sample option 04 report

MMH PER 1000 FH

SUBSYSTEM- AC320 (63A00) UHF RADIO SET MFHBMA= 62.9

	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
LRU- AC321 (63AA0) RECEIVER/TRANSMITTER (UHF)									
W	4.318	2.159	15.113	5.397				107.949	134.936
K	0.188	0.094	0.657	0.234				0.657	1.829
N	0.188	0.094	0.657	0.234				0.610	1.782
SUB	4.693	2.347	16.426	5.866				109.215	138.548
LRU- AC322 (63AE0) DIPLEXER									
W	0.050	0.025	0.176	0.063				0.100	0.414
K	0.	0.	0.	0.				0.	0.
N	0.006	0.003	0.020	0.007				0.014	0.050
SUB	0.056	0.028	0.196	0.070				0.115	0.465
LRU- AC323 (63AL0) STANDING WAVE RATIO INDICATOR									
W	0.033	0.017	0.116	0.041				0.488	0.694
K	0.	0.	0.	0.				0.	0.
N	0.033	0.017	0.116	0.041				0.058	0.265
SUB	0.066	0.033	0.231	0.083				0.546	0.959
CND	0.827				3.307				4.134
M	0.719	0.360				3.956	0.899		5.934
TOT/TSK	6.361	2.767	16.853	6.019	3.307	3.956	0.899	109.876	150.038

Figure 25. Sample option 05 report

MAINT. INDEX X 1000

SUBSYSTEM- AC320 (63A00) UHF RADIO SET MFHBMA= 62.9

	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
LRU- AC321	(63AA0)		RECEIVER/TRANSMITTER (UHF)						
W	2.1590	2.1590	15.1129	5.3975				53.9746	78.8029
K	0.0938	0.0938	0.6566	0.2345				0.6566	1.7353
N	0.0938	0.0938	0.6566	0.2345				0.6097	1.6884
SUB	2.3466	2.3466	16.4261	5.8665				55.2409	82.2265
LRU- AC322	(63AE0)		DIPLEXER						
W	0.0251	0.0251	0.1758	0.0628				0.1005	0.3893
K	0.	0.	0.	0.				0.	0.
N	0.0029	0.0029	0.0200	0.0072				0.0143	0.0472
SUB	0.0280	0.0280	0.1959	0.0700				0.1148	0.4366
LRU- AC323	(63AL0)		STANDING WAVE RATIO INDICATOR						
W	0.0165	0.0165	0.1157	0.0413				0.4878	0.6779
K	0.	0.	0.	0.				0.	0.
N	0.0165	0.0165	0.1157	0.0413				0.0579	0.2480
SUB	0.0331	0.0331	0.2315	0.0827				0.5456	0.9259
CND	0.4134				1.6534				2.0668
M	0.3596	0.3596				1.9779	0.8990		3.5962
TOT/TSK	3.1806	2.7672	16.8534	6.0191	1.6534	1.9779	0.8990	55.9013	89.2520

Figure 26. Sample option 06 report

MTTR OVER SUBSYSTEMS AC3

	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
TOT/TSK	0.6001	1.5441	2.1311	0.5709	0.4140	1.4302	0.4173	5.1344	12.2419

Figure 27. Sample option 07 report

MTTR % OF TOTAL PER AC3

	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
TOT/TSK	4.902	12.613	17.408	4.663	3.382	11.683	3.408	41.941	100.000

Figure 28. Sample option 08 report

MMH OVER SUBSYSTEMS AC3

	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
TOT/TSK	1.2001	1.5441	2.1311	0.7632	0.5880	1.9452	0.7780	9.4684	18.4180

Figure 29. Sample option 09 report

MMH % OF TOTAL PER AC3

	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
TOT/TSK	6.516	8.383	11.571	4.144	3.193	10.562	4.224	51.408	100.000

Figure 30. Sample option 10 report

MMH PER 1000 FH PER AC3

	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
TOT/TSK	0.07183	0.09242	0.12755	0.04568	0.03519	0.11643	0.04656	0.56671	1.10237

Figure 31. Sample option 11 report

MAINT IND X 1000 PER AC3

	AGE F/L	TS F/L	R+R	VR+R	CND A/C	M A/C	VM A/C	SHOP	TOT/OUT
TOT/TSK	0.03592	0.09242	0.12755	0.03417	0.02478	0.08560	0.02497	0.30731	0.73272

Figure 32. Sample option 12 report

Appendix A. DESCRIPTION OF INPUT DATA ELEMENTS

Appendix A. DESCRIPTION OF INPUT DATA ELEMENTS

KEY FIELDS - Columns 1-11 are used as the key fields, and therefore, the format is common to all the card types.

Columns	Identifier - Definition
1-2	Card Type - (1) indicates the type of data to be found on the record, and (2) indicates whether they reflect flight line, shop, or reference data CR - cross reference LF - AFSC with skill level - F/L LS - AFSC with skill level - shop MF - reliability mean values - F/L PF - P probability - F/L PS - P probability - shop SF - support equipment - F/L SS - support equipment - shop TF - task time - F/L TS - task time - shop
4-10	Equipment Identification (ID) Number - defines the equipment in a series of codes showing as follows: (4) type of weapon system; (5) major system within the weapon system; (6) functional grouping of the major system; and (7-10) a numerical breakdown by operational function (e.g., radar navigation, radio navigation, or bombing navigation), subsystem, line replaceable unit, and shop replaceable unit. These codes are determined by the user since they are configuration dependent. The codes used in the DAIS data banks are listed in Appendix A to volume one of this report. Example of data card encoding format used in DAIS R&M model for equipment specifications: Column 4 - weapon system none assigned in DAIS data banks Column 5 - major system A - avionics Column 6 - functional group A - air-ground-attack C - communications I - instruments M - miscellaneous N - navigation Z - core

Columns	Identifier - Definition
	Column 7 - operational function Column 8 - subsystem Column 9 - line replaceable unit Column 10 - shop replaceable unit none assigned in DAIS data banks
11-12	Card Sequence - the sequential number of each record for a particular subsystem or line replaceable unit within a particular card type.

FLIGHT LINE TASKS - Common to LF, PF, SF, and TF card types.

Columns	(Task Code)	Task Name - Definition
1-12		See key fields
14-18	(A)	Set up the support equipment and maintenance stands - that will be used by the technician to provide the power and the accessibility necessary to troubleshoot and repair the equipment that has failed.
20-24	(T)	Troubleshoot - the reported discrepancy to isolate the cause and to determine whether the repair action is to be a remove and replace or the repair can be accomplished on the aircraft.
26-30	(C)	Cannot Duplicate - a troubleshooting action that cannot duplicate (CND) the reported discrepancy.
32-36	(R)	Remove & Replace - once the discrepancy has been isolated to a particular LRU and a determination has been made that the repair is to be made in the shop, the faulty unit is removed and replaced by a spare.
38-42	(M)	On A/C Maintenance - if the discrepancy is minor and does not need shop repair, the equipment is maintained on the aircraft (A/C). This includes, as examples, adjustments, replacement of bulbs, knobs, fuses, and aircraft wiring problems.

Columns	(Task Code)	Task Name - Definition
44-48	(V_R)	R&R Verification - after the removal and replacement of the faulty LRU is completed, a functional check is performed to verify the operational condition of the subsystem.
50-54	(V_M)	On A/C Maintenance Verification - upon completion of any on aircraft maintenance, a functional check is performed to verify the repair and operational condition of the subsystem.

SHOP TASKS - Common to LS, SS, PS, and TS card types.

1-12		See key fields
20-24	(W)	Bench Check & Repair - in-shop bench check and complete repair of a bad LRU, including cleaning, inspection, disassembly, adjustment, part replacement, reassembly, and lubrication of the complete LRU and any minor components.
26-30	(K)	Bench Check & CND - in-shop bench check is performed, any discrepancy cannot be duplicated in the testing, the LRU is serviceable, and no repair is required.
32-36	(N)	Bench Check & NRTS - in-shop bench check or inspection shows that the LRU is not repairable this station (NRTS) because the shop is not authorized to accomplish the repair or the shop lacks the proper tools, equipment, facilities, technical skills, spare parts, time, or technical data to perform repair.
50-54	(TD)	Test Drawer Repair - in-shop repair of the test station drawer (or combination of test equipment) that is needed to test the LRU being checked.
56-60	(TS)	Test Station Repair - in-shop repair of the entire test station that is needed to test the LRU being checked.

CROSS REFERENCE FILE - Card #1

Columns	Identifier - Definition
1-9	See key field
11-12	Card sequence always - 1
14-18	Weight - in pounds of the LRU.
20-24	(WUC) work unit code used to identify each subsystem and LRU in the aircraft system (found on cards #1 and 2).
26-27	(QPA) the quantity per aircraft of a particular subsystem or LRU in the aircraft system (found on cards #1 and 2).
29-67	Equipment name or description of the operational function assigned to a subsystem or LRU.
75-76	The number of LRUs in the subsystem for which input data has been provided, and the number of SRUs per LRU on LRU input cards. Input data are provided for those LRUs requiring a significant amount of unscheduled maintenance.

CROSS REFERENCE FILE - Card #2

1-9	See key field
11-12	Card sequence always - 2
20-24	(WUC) - work unit code used to identify each subsystem and LRU in the aircraft system
26-48	(NSN) - national stock number assigned to the LRU
50-59	AN/nomenclature of the particular subsystem or LRU described on card #1
65-80	Manufacturer's Stock Number - when available

RELIABILITY MEAN VALUES - Flight Line

1-12	See key field
14-19	Mean flight hours between maintenance actions - ($MFHBMA_j$) shows the frequency of unscheduled maintenance activities required by a subsystem (j).

Columns	Identifier - Definition
21-26	H factor - is the ratio of the number of LRUs tested in the shop to the number of flight line removal actions; only the value greater than unity of the ratio is input whereby the model automatically adds the integer "1" to the given value. The resultant portion that is greater than one accounts for any mulitple LRU removals resulting from single flight line repair actions (i.e., two or more LRUs removed for one reported aircraft maintenance action). This factor is used as a multiplier of the shop probability of occurrences to obtain the actual number of shop maintenance actions eminating from flight line removal(s).

Appendix B. ERROR MESSAGES

Appendix B. ERROR MESSAGES

The following is a list of input error messages which are printed by the R&M model. The messages are described and the attributable cause or causes are listed.

_______Invalid Option

The user has selected an option outside the range of 1 to 13. The option number might not be punched properly in column 9 and 10.

Current Max Subsystems at 40

User has exceeded the program's present capacity for subsystem data input. The first card in front of the base data files contains the number of subsystems to be described. The maximum allowed is 40. The number punched in columns 1 and 2 does not fall within this range.

Preceding Subsystem Card Sequence Error

The subsystem listed just prior to this message has an error in the card sequence number, or the card type identification is invalid. The sequence number should be one in column 12 and the card type should be CR in columns 1 and 2.

_______Card where ____________Card Belongs

This message appears whenever the program reads a card other than the type it expected to read. It specifies in the blanks the two card types involved. Either a card(s) is misplaced in the base data files, or one or more errors were made in punching the identification type(s), or when a card is missing.

Card Sequence Error

Some card types may allow for more than one card per equipment. In these cases, the second card must have a '2' punched in the "card sequence" field in column 12. In all cases, the first or only card for an equipment must have a '1' in this field. This error indicates a card sequencing problem that could be caused by an omission of a card 1, a mispunch in columns 1-11, or a card out of sequence.

Subsystem Equip ID Invalid

The CR cards designate the subsystem identification which consists of seven characters (columns 4-10) describing the equipment. All other card types refer to the identification as first listed in the CR card. This message declares that the subsystem identification on the card last printed did not match any which were previously entered on CR cards.

Current Max SEs Set at ________

Though the model is designed to accept several support equipments for each task, currently the maximum is set at three for the SF cards and at two for the SS cards. The user must discard the remaining support equipments for this task or the computer program must be modified to accept a higher limit.

Current Max AFSCs Set at ________

Though the model is designed to accept several AFSCs for each task, currently the maximum is set at five. The user must discard the remaining AFSCs for this task or modify the computer program to accept a higher limit.

Invalid Equipment ID

For the subsystems (equipment) with more than one card for any card type, the equipment ID on successive cards within that set must match that of the first. This message points out a violation on the preceding card.

LRU Equipment ID Invalid

Each LRU is identified by a unique seven-character designation which must be initially inputted to the program on a CR card. Any other input card type pertaining to that LRU must contain this same identification. This message indicates that either: (1) the last printed LRU card contained an identification for which the program has no previous CR card record; or (2) a mismatch exists.

Appendix C. ACRONYMS

Appendix C - ACRONYMS

A	inherent availability
AC	avionics communication subsystems
A/C	aircraft
AFSC	Air Force specialty code
AN	avionics navigation subsystems
CDC	Control Data Corporation
CND	cannot duplicate the discrepancy
CR	cross reference file
DAIS	digital avionics information system
FH	flight hours
F/L	flight line
FOM	figure of merit
ID	identification number of a subsystem on an LRU
KFH	1000 flight hours
LCC	life cycle cost
LCCIM	life cycle cost impact model
LF	manpower specialty - flight line file
LRU	line replaceable unit
LS	manpower specialty - shop file
MF	reliability mean values - flight line file
MFHBMA	mean flight hours between maintenance actions
MMH	maintenance man hours
MTTR	mean time to repair
NRTS	not repairable this station
NSN	national stock number
PF	P probability - flight line file
PMA	probability of a maintenance action
PS	P probability - shop file
QPA	quantity per aircraft
R&M	reliability and maintainability
R&R	remove and replace maintenance action
RTOK	retest okay
SE	support equipment
SF	support equipment - flight line file
SRU	shop replaceable unit
SS	support equipment - shop file
TF	task time - flight line file
TS	task time - shop file
WUC	work unit code

Appendix D

DAIS RELIABILITY AND MAINTAINABILITY MODEL

(File Name RANDM)

Listing of Control Data Corporation CDC-6600, Cyber 74 Version

```
      PROGRAM RM2(INPUT,TAPE5=INPUT,OUTPUT,TAPE6=OUTPUT,
     *  TAPE4,TAPE8)
C
C MAIN ROUTINE OF THE R&M MODEL.
C
     DIMENSION TITLE(5,13),WANT(100),ROW(13),T(4),NUM(4)
     DIMENSION ARRAY(6),RATE(50),ARATE(6),AF(50),JSFLAG(7)
     DIMENSION SC(9),TOT(21)
C FOLLOWING IS DATA ASSOCIATED WITH SUBSYSTEMS. TO ALLOW FOR MORE,CHANGE
C EACH 40 IN THE RIGHT SUBSCRIPT OF THE FOLLOWING SUBSYSTEM ATTRIBUTES
C TO THE DESIRED MAXIMUM.  TO ALLOW FOR MORE AFSC'S PER SUBSYSTEM
C TASK, CHANGE EACH 3 IN THE LEFTMOST SUBSCRIPT TO THE DESIRED NUMBER.
C ALSO CHANGE THESE COMMENTS TO REFLECT THE NEW VALUES.
C
      DIMENSION NUML(40),KLRU(40),TSFL(7,40),PSM(7,40),HFAC(40),
     *  NSAFSC(7,40),FHBMA(40),JNAC(40),NSFSE(7,40),AVAIL(40)
      DIMENSION SWUC(40),SFSE(2,7,40),SFAFSC(5,7,40)
      DIMENSION SNAME(5,40)
      DIMENSION SEQID(40)
      COMMON/SUBS/SNAME,TSFL,PSM,SWUC,SFSE,
     *  SFAFSC,NSAFSC,NSFSE,FHBMA,JNAC,HFAC
C
C FOLLOWING IS DATA ASSOCIATED WITH LRU'S.  IN A MANNER SIMILAR
C TO THE ABOVE FOR SUBSYSTEMS, TO ALLOW FOR MORE, CHANGE EACH 120 TO THE
C DESIRED NUMBER.  TO ALLOW FOR MORE AFSC'S PER TASK, CHANGE EACH 3
C IN THE LEFTMOST SUBSCRIPT TO THE DESIRED NUMBER.  CHANGE BOTH THE 20
C AND THE 3 IN THESE COMMENTS.
C
      DIMENSION LDRAW(120),LNAC(120),TLSHOP(5,120),NLAFSC(5,120)
      DIMENSION PLRR(5,120),NLSE(5,120)
      REAL LSAFSC,LSE
      DIMENSION LWUC(120),LSAFSC(5,5,120),LSE(2,5,120)
      DIMENSION LNAME(5,120)
      REAL LEQID
      DIMENSION LEQID(120)
```

```
      COMMON/LRUS/LNAME,TLSHOP,PLRR,LWUC,LSAFSC,
     * LSE,NLAFSC,NLSE,LDRAW,LNAC
C
      COMMON/SIZES/NSUB,NLRU,KLRU,NUML
      COMMON/EQIDS/SEQID,LEQID
C
      DIMENSION LABEL(8)
      COMMON/LABL/LABEL
C
C IN THE FOLLOWING STATEMENTS, CHANGE THE 40 TO THE MAXIMUM SUBSYSTEMS,
C THE 120 TO MAXIMUM LRUS IN THE 1ST AND 2ND CARD RESPECTIVELY (AND IN
C THESE COMMENTS). CHANGE THE 7440 TO THE SUM OF THE PRODUCTS OF THE NEW
C DIMENSIONS.
C
      DIMENSION TTR(21,40),EMMH(21,40)
      DIMENSION TTRL(6,4,120),EMMHL(6,4,120)
      DATA TTR,EMMH,TTRL,EMMHL/7440*0.0/
      DATA BLANK,ALLMP/5H     ,5HALLMP/
      DATA NBASIC/2/
C
C
C
      DATA TITLE/4HMTTR,4H BY ,4HTASK,4H PER,4H LRU,
     * 4HMTTR,4H AS ,4H% OF,4H TOT,4HAL  ,
     * 4HMMH ,4HBY T,4HASK ,4HPER ,4HLRU ,
     * 4HMMH ,4HAS %,4H OF ,4HTOTA,4HL   ,
     * 4HMMH ,4HPER ,4H1000,4H FH ,4H    ,
     * 4HMAIN,4HT. I,4HNDEX,4H X 1,4H000 ,
     * 4HMTTR,4H OVE,4HR SU,4HBBSYS,4HTEMS,
     * 4HMTTR,4H % O,4HF TO,4HTAL ,4HPER ,
     * 4HMMH ,4HOVER,4H SUB,4HSYST,4HEMS ,
     * 4HMMH ,4H% OF,4H TOT,4HAL P,4HER  ,
     * 4HMMH ,4HPER ,4H1000,4H FH ,4HPER ,
     * 4HMAIN,4HT IN,4HD X ,4H1000,4H PER,
```

```
     *   4HMMH ,4HREQU,4HIRIN,4HG MP,4HSC- /
C
C READ IN AFSC AND SE OUTPUTS DESIRED.
      READ(5,1) NWANT
    1 FORMAT(I3)
      IF (NWANT.EQ.0) GO TO 9
      I=0
    2 READ(5,3) ROW
    3 FORMAT(13(A5,1X))
      J=0
    4 J=J+1
      IF·(J.GT.13) GO TO 2
      IF (ROW(J).EQ.BLANK) GO TO 4
      I=I+1
      WANT(I)=ROW(J)
      IF (I.LT.NWANT) GO TO 4
C
C FIRST READ IN THE BASE FILE DATA.
    9 CALL READ
C
C NEXT CALCULATE THE MTTR FOR THE SHOP ACTIVITIES (BACK THRU FLIGHTLINE)
C FOR EACH LRU.
C FIRST SET SUBSYSTEM FLIGHTLINE TASK TIMES AND # OF AFSCS.
      DO 50  JSUB=1,NSUB
      T(1)=TSFL(1,JSUB)
      T(2)=TSFL(2,JSUB)
      T(3)=TSFL(4,JSUB)
      T(4)=TSFL(6,JSUB)
      NUM(1) = NSAFSC(1,JSUB)
      NUM(2) = NSAFSC(2,JSUB)
      NUM(3) = NSAFSC(4,JSUB)
      NUM(4) = NSAFSC(6,JSUB)
C
C NOW FILL IN THE SPECIAL FLIGHTLINE ARRAY.
```

```
      TTR(7,JSUB)=PSM(3,JSUB) * TSFL(1,JSUB)
      TTR(10,JSUB)=PSM(3,JSUB) * TSFL(3,JSUB)
      P=PSM(5,JSUB)
      TTR(8,JSUB)=P*TSFL(1,JSUB)
      TTR(9,JSUB)=P*TSFL(2,JSUB)
      TTR(11,JSUB)=P*TSFL(5,JSUB)
      TTR(12,JSUB)=P*TSFL(7,JSUB)
C
C FILL IN MMH TABLE BASED ON # AFSCS REQUIRED.
      EMMH(7,JSUB) = TTR(7,JSUB) * NSAFSC(1,JSUB)
      EMMH(10,JSUB) = TTR(10,JSUB) * NSAFSC(3,JSUB)
      EMMH(8,JSUB) = TTR(8,JSUB) * NSAFSC(1,JSUB)
      EMMH(9,JSUB) = TTR(9,JSUB) * NSAFSC(2,JSUB)
      EMMH(11,JSUB) = TTR(11,JSUB) * NSAFSC(5,JSUB)
      EMMH(12,JSUB) = TTR(12,JSUB) * NSAFSC(7,JSUB)
C
C NOW FIND THE STARTING LRU FOR THIS SUBSYSTEM AND THE NUMBER OF LRUS.
      JLRU=KLRU(JSUB)
      NR=NUML(JSUB)
C
C NOW FOR EACH LRU IN THIS SUBSYSTEM, LOOP THROUGH
      DO 40  K=1,NR
C
C NOW LOOP THROUGH EACH SHOP TASK, PICKING OUT THE LRU PROBABILITY.
      DO 30  M=1,3
      P=PLRR(M,JLRU)
C
C NOW FOR EACH FLIGHTLINE TASK, COMPUTE THE MTTR AND MMH.
      DO 20  N=1,4
      TTRL(N,M,JLRU) = T(N) * P
      EMMHL(N,M,JLRU) = TTRL(N,M,JLRU) * NUM(N)
   20 CONTINUE
C COMPUTE MTTR FOR SHOP TASK.
      TTRL(5,M,JLRU) = TLSHOP(M,JLRU) * P * HFAC(JSUB)
```

```
      EMMHL(5,M,JLRU) = TTRL(5,M,JLRU) * NLAFSC(M,JLRU)
   30 CONTINUE
C
C NOW PREPARE FOR NEXT LRU IN THIS SUBSYSTEM.
   40 JLRU=JLRU+1
C
   50 CONTINUE
C
C
C
C
C
C NOW TOTAL UP THE VARIOUS COLUMNS
      CALL ADDUP (TTR(1,1),TTRL(1,1,1))
      CALL ADDUP (EMMH(1,1),EMMHL(1,1,1))
C
C NOW READ IN THE AFSC"S OF INTEREST.  MAX=50
C
      READ(4,60) NAF
   60 FORMAT(I3)
      I=0
      IF (NAF.EQ.0) GO TO 154
      IF (NAF.LT.51) GO TO 62
      WRITE(6,61) NAF
   61 FORMAT (1XI4,37H AFSC"S IS MORE THAN CURRENT LIMIT OF,I3)
      STOP
   62 READ(4,63) (ARRAY(K),ARATE(K),K=1,6)
      WRITE(6,64) (ARRAY(K),ARATE(K),K=1,6)
   63 FORMAT(6(A5,F6.2,1X))
   64 FORMAT(1X6(A5,F6.2,1X))
C
      J=0
   65 J=J+1
      IF(J.GT.6) GO TO 62
```

```
      IF(ARRAY(J).EQ.BLANK) GO TO 65
      I=I+1
      AF(I)=ARRAY(J)
      RATE(I)=ARATE(J)
      IF (RATE(I).EQ.0.0) RATE(I)=1.0
      IF (I.LT.NAF) GO TO 65
C
C NOW READ AND PRINT SUPPORT EQUIPMENT RESULTS
      CALL SEDUMP(TTRL,TTR,NWANT,WANT)
C
C LOOP THROUGH EACH AFSC OF INTEREST COPYING MTTR ARRAY FOR TASKS FOR
C WHICH THIS AFSC IS REQUIRED.
      DO 152  N=1,NAF
      AFSC=AF(N)
      RAT=RATE(N)
      TOTM=0.0
      TOTC=0.0
      LPR=0
      DO 66  LL=1,NWANT
      IF (WANT(LL).EQ.AFSC.OR.WANT(LL).EQ.ALLMP) GO TO 67
   66 CONTINUE
      GO TO 691
   67 WRITE(6,68) AFSC,RAT,LABEL
      LPR=1
   68 FORMAT(6H1MPSC-,A5,2X1H$,F5.2,10X8A10/6X5H-----//,
     * 14X20HMMH/KFH      COST/KFH/14X7H-------,5X8H--------/)
   69 FORMAT(1XA5)
C
C LOOP THROUGH SUBSYSTEMS.
691   DO 150  JSUB=1,NSUB
      TOTSM=0.0
      TOTSC=0.0
      JLRU=KLRU(JSUB)
      NR=NUML(JSUB)
```

```
      FAC=1000./FHBMA(JSUB)
C
C SET UP 7 FLAGS DETERMINING WHICH OF THE 7 FLIGHTLINE TASKS
C FOR THIS SUBSYSTEM REQUIRE THIS AFSC.
      DO 80  JJ=1,7
      JSFLAG(JJ)=0
C
C CHECK FOR MATCH ACROSS ALL AFSCS REQUIRED FOR THIS TASK.
      NJJS=NSAFSC(JJ,JSUB)
      DO 70  KK=1,NJJS
      IF (AFSC.NE.SFAFSC(KK,JJ,JSUB)) GO TO 70
C SET THE FLAG SHOWING THIS AFSC IS REQUIRED FOR THIS TASK.
      JSFLAG(JJ) = JSFLAG(JJ)+1
   70 CONTINUE
   80 CONTINUE
C
C SUBSYSTEM FLAGS ARE NOW SET UP.  COPY MTTR WHERE APPLICABLE.
      SC(1) = TTR(7,JSUB)*JSFLAG(1)
      SC(1)=SC(1) + TTR(8,JSUB)*JSFLAG(1)
      SC(2)=TTR(9,JSUB)*JSFLAG(2)
      SC(5)=TTR(10,JSUB)*JSFLAG(3)
      SC(6)=TTR(11,JSUB)*JSFLAG(5)
      SC(7)=TTR(12,JSUB)*JSFLAG(7)
      SC(3)=0.0
      SC(4)=0.0
      SC(8)=0.0
      SC(9)=0.0
C
C LOOP THROUGH LRUS
      DO 130  K=1,NR
      SCL=0.0
      DO 110  M=1,3
C
C SEE IF EITHER THE W,K, OR N TASKS NEED THIS AFSC. IF SO, COPY
```

```
C THE MTTR ENTRY.
      NLMJ=NLAFSC(M,JLRU)
      DO 100  KK=1,NLMJ
      IF (AFSC.NE.LSAFSC(KK,M,JLRU)) GO TO 100
      SCL=SCL+TTRL(5,M,JLRU)
      SC(8) = TTRL(5,M,JLRU) + SC(8)
  100 CONTINUE
C
C NOW FOR THE FOUR FLIGHLINE PORTIONS.
      SC(1)=SC(1)+TTRL(1,M,JLRU) * JSFLAG(1)
      SC(2)=SC(2)+TTRL(2,M,JLRU) * JSFLAG(2)
      SC(3)=SC(3)+TTRL(3,M,JLRU) * JSFLAG(4)
  110 SC(4)=SC(4)+TTRL(4,M,JLRU) * JSFLAG(6)
      SCL=SCL*FAC
      SCC=SCL*RAT
      TOTSM=TOTSM+SCL
      TOTSC=TOTSC+SCC
      IF (SCL.GT.0.0.AND.LPR.EQ.1) WRITE(6,120) LEQID(JLRU),SCL,SCC
  120 FORMAT(1XA7,2F13.5)
  130 JLRU=JLRU+1
      DO 145  J=1,8
      SC(J)=SC(J)*FAC
  145 SC(9)=SC(9)+SC(J)
C
      IF (SC(9).EQ.0.0) GO TO 150
      SCC=SC(9)*RAT
      TOTSM=SC(9)-TOTSM
      TOTSC=SCC-TOTSC
      IF(LPR.EQ.1)WRITE(6,149) TOTSM,TOTSC,SEQID(JSUB),SC(9),SCC
  149 FORMAT(4X2HFL,2X2F13.5/8X2(6X7H-------)/1XA7,2F13.5//)
      TOTM=TOTM+SC(9)
      TOTC=TOTC+SCC
  150 CONTINUE
  151 FORMAT(1XF10.4)
```

```
C
C NOW PRINT AFSC TOTALS
  152  IF(LPR.EQ.1) WRITE(6,153) TOTM,TOTC
  153  FORMAT(8X2(6X7H-------)/1X5HTOTAL,2X2F13.5)
C
C CALCULATE AND PRINT AVAILABILITIES
  154  DO 155  JSUB=1,NSUB
  155  AVAIL(JSUB)=1.0/(1.0+TTR(21,JSUB)/FHBMA(JSUB))
       CALL AOUT(AVAIL,SEQID,NSUB)
C
C READ OUTPUT REQUESTS
  160  READ(5,170) EQ,JOPT
       IF (EOF(5).NE.0) GO TO 999
  170  FORMAT(A7,1XI2)
       IF (JOPT.GT.0) GO TO 185
  175  WRITE(6,180) EQ,JOPT
  180  FORMAT(1H1,A7,I3,2X15HINVALID OPTION.)
       GO TO 160
C
C LOOP THROUGH SUBSYSTEMS FOR FIRST 5 OPTIONS.
  185  DO 187  J=1,21
  187  TOT(J)=0.0
       TOTFL=0.0
       IF (JOPT.GT.12) GO TO 470
       DO 400  J=1,NSUB
       JSUB=J
       IF (JOPT.GT.6) GO TO 250
       IF (EQ.NE.BLANK.AND.EQ.NE.SEQID(JSUB)) GO TO 400
       GO TO (190,200,210,220,230,240),JOPT
C
C
  190  CALL DUMP(TITLE,BLANK,JSUB,1.0,
     *  TTR(1,JSUB),TTRL(1,1,1))
       GO TO 400
```

```
C
C
  200  CALL DUMP(TITLE(1,2),BLANK,JSUB,
     *  100./TTR(15,JSUB),TTR(1,JSUB),TTRL(1,1,1))
       GO TO 400
  210  CALL DUMP(TITLE(1,3),BLANK,JSUB,1.0,
     *  EMMH(1,JSUB),EMMHL(1,1,1))
       GO TO 400
C
C
  220  CALL DUMP(TITLE(1,4),BLANK,JSUB,
     *  100./EMMH(15,JSUB),EMMH(1,JSUB),EMMHL(1,1,1))
       GO TO 400
C
C
  230  CALL DUMP(TITLE(1,5),BLANK,JSUB,
     *  1000./FHBMA(JSUB),EMMH(1,JSUB),EMMHL(1,1,1))
       GO TO 400
C
C
  240  CALL DUMP(TITLE(1,6),BLANK,JSUB,1000./FHBMA(JSUB),
     *  TTR(1,JSUB),TTRL(1,1,1))
       GO TO 400
C
C TOTAL UP APPROPRIATE SUBSYSTEMS
  250  CALL EQUALS(EQ,SEQID(JSUB),IN)
       IF (IN.EQ.0) GO TO 400
       IF (JOPT.GE.9.AND.JOPT.LE.11) IN=2
       DO 260  K=1,21
       IF (IN.EQ.1) TOT(K)=TOT(K)+TTR(K,JSUB)
       IF (IN.EQ.2) TOT(K)=TOT(K)+EMMH(K,JSUB)
  260  TOTFL=TOTFL+FHBMA(JSUB)
  400  CONTINUE
C
```

```
C DUMP OUT TOTALS ACROSS SUBSYSTEMS
      IF (JOPT.LE.6.OR.JOPT.GE.13) GO TO 160
      IN=JOPT-6
      GO TO (410,420,430,440,450,460),IN
  410 CALL DUMP(TITLE(1,7),EQ,0,1.0,TOT,DUMMY)
      GO TO 160
  420 CALL DUMP(TITLE(1,8),EQ,0,100./TOT(15),TOT,DUMMY)
      GO TO 160
  430 CALL DUMP(TITLE(1,9),EQ,0,1.0,TOT,DUMMY)
      GO TO 160
  440 CALL DUMP(TITLE(1,10),EQ,0,100./TOT(15),TOT,DUMMY)
      GO TO 160
  450 CALL DUMP(TITLE(1,11),EQ,0,1000./TOTFL,TOT,DUMMY)
      GO TO 160
  460 CALL DUMP(TITLE(1,12),EQ,0,1000./TOTFL,TOT,DUMMY)
      GO TO 160
C
C PRINT MTTR, MMH ARRAY TOTALS
  470 IF (JOPT.GT.13) GO TO 175
      CALL DUMP2(1,TTR(1,1))
      CALL DUMP2(2,EMMH(1,1))
      GO TO 160
C
C
  999 WRITE(6,1000)
 1000 FORMAT(20H1NORMAL TERMINATION.)
C
      STOP
      END
```

SYMBOLIC REFERENCE MAP (R=1)

```
     SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
10270  RM2

VARIABLES      SN  TYPE            RELOCATION
12252  AF          REAL       ARRAY                11636  AFSC        REAL
11406  ALLMP       REAL                            12244  ARATE       REAL       ARRAY
12154  ARRAY       REAL       ARRAY                12401  AVAIL       REAL       ARRAY
11405  BLANK       REAL                            11661  DUMMY       REAL
14161  EMMH        REAL       ARRAY                23371  EMMHL       REAL       ARRAY
11655  EQ          REAL                            11646  FAC         REAL
 6370  FHBMA       REAL       ARRAY    SUBS         6510  HFAC        REAL       ARRAY    SUBS
11624  I           INTEGER                         11660  IN          INTEGER
11625  J           INTEGER                         11647  JJ          INTEGER
11630  JLRU        INTEGER                          6440  JNAC        INTEGER    ARRAY    SUBS
11656  JOPT        INTEGER                         12334  JSFLAG      INTEGER    ARRAY
11626  JSUB        INTEGER                         11632  K           INTEGER
11651  KK          INTEGER                             2  KLRU        INTEGER    ARRAY    SIZES
    0  LABEL       INTEGER    ARRAY    LABL        16230  LDRAW       INTEGER    ARRAY    LRUS
   50  LEQID       REAL       ARRAY    EQIDS       11643  LL          INTEGER
16420  LNAC        INTEGER    ARRAY    LRUS            0  LNAME       INTEGER    ARRAY    LRUS
11642  LPR         INTEGER                          3600  LSAFSC      REAL       ARRAY    LRUS
11470  LSE         REAL       ARRAY    LRUS         3410  LWUC        INTEGER    ARRAY    LRUS
VARIABLES      SN  TYPE            RELOCATION
11633  M           INTEGER                         11634  N           INTEGER
11635  NAF         INTEGER                         11407  NBASIC      INTEGER
11650  NJJS        INTEGER                         13750  NLAFSC      INTEGER    ARRAY    LRUS
11653  NLMJ        INTEGER                             1  NLRU        INTEGER             SIZES
15100  NLSE        INTEGER    ARRAY    LRUS        11631  NR          INTEGER
 5310  NSAFSC      INTEGER    ARRAY    SUBS         5740  NSFSE       INTEGER    ARRAY    SUBS
    0  NSUB        INTEGER             SIZES       12150  NUM         INTEGER    ARRAY
   52  NUML        INTEGER    ARRAY    SIZES       11623  NWANT       INTEGER
11627  P           REAL                             2260  PLRR        REAL       ARRAY    LRUS
  740  PSM         REAL       ARRAY    SUBS        11637  RAT         REAL
```

```
12162  RATE      REAL      ARRAY                      12127  ROW       REAL      ARRAY
12343  SC        REAL      ARRAY                      11654  SCC       REAL
11652  SCL       REAL                                     0  SEQID     REAL      ARRAY    EQIDS
 2520  SFAFSC    REAL      ARRAY    SUBS               1440  SFSE      REAL      ARRAY    SUBS
    0  SNAME     REAL      ARRAY    SUBS               1370  SWUC      REAL      ARRAY    SUBS
12144  T         REAL      ARRAY                      11662  TITLE     REAL      ARRAY
 1130  TLSHOP    REAL      ARRAY    LRUS              12354  TOT       REAL      ARRAY
11641  TOTC      REAL                                 11657  TOTFL     REAL
11640  TOTM      REAL                                 11645  TOTSC     REAL
11644  TOTSM     REAL                                   310  TSFL      REAL      ARRAY    SUBS
12451  TTR       REAL      ARRAY                      15671  TTRL      REAL      ARRAY
11763  WANT      REAL      ARRAY

FILE NAMES        MODE
    0  INPUT                 2054  OUTPUT                     4130  TAPE4     FMT              0  TAPE5     FMT
 2054  TAPE6     FMT         6204  TAPE8

EXTERNALS          TYPE   ARGS
       ADDUP               2                          AOUT                3
       DUMP                6                          DUMP2               2
       EOF       REAL      1                          EQUALS              3
       READ                0                          SEDUMP              4

STATEMENT LABELS
11415  1        FMT                     10275  2                                11424  3       FMT
10300  4                                10310  9                                    0  20
    0  30                                   0  40                                   0  50
11434  60       FMT                     11442  61      FMT                      10444  62
11467  63       FMT                     11472  64      FMT                      10475  65
    0  66                               10533  67                               11503  68      FMT
11516  69       FMT  NO REFS            10566  70                                   0  80
10642  100                                  0  110                              11526  120     FMT
    0  130                                  0  145                              11541  149     FMT
10736  150                              11547  151     FMT  NO REFS                 0  152
```

```
11556  153    FMT                       10747  154                                  0  155
10762  160                              11571  170      FMT                     10770  175
11600  180    FMT                       10773  185                                  0  187
11027  190                              11034  200                              11043  210
11050  220                              11057  230                              11066  240
11075  250                                  0  260                              11131  400
11152  410                              11155  420                              11162  430
11165  440                              11172  450                              11177  460
11204  470                              10536  691                              11213  999
11610  1000   FMT
LOOPS  LABEL   INDEX     FROM-TO     LENGTH    PROPERTIES
10312  50    * JSUB       93 144      117B                NOT INNER
10366  40    * K         125 142       40B                NOT INNER
10367  30    * M         128 139       33B                NOT INNER
10401  20      N         132 135        5B      INSTACK
10447        * K         164 164       10B                EXT REFS
10463        * K         165 165       10B                EXT REFS
10514  152   * N         184 276      233B                EXT REFS  NOT INNER
10522  66    * LL        190 192       10B        OPT       EXITS
10537  150   * JSUB      201 272      202B                EXT REFS  NOT INNER
10547  80    * JJ        210 220       24B                NOT INNER
10563  70      KK        215 219        4B      INSTACK
10615  130   * K         235 259       72B                EXT REFS  NOT INNER
10617  110   * M         237 252       47B                NOT INNER
10635  100     KK        242 246        6B      INSTACK
10712  145     J         260 262        4B      INSTACK
10753  155     JSUB      280 281        5B      INSTACK
10776  187     J         294 295        2B      INSTACK
11005  400   * J         298 340     1279                 EXT REFS  NOT INNER
11117  260     K         336 339       11B        OPT

COMMON BLOCKS  LENGTH
       SUBS      3440
       LRUS      7560
```

AD-A068 826   DYNAMICS RESEARCH CORP   WILMINGTON MASS   F/G 14/4
DIGITAL AVIONICS INFORMATION SYSTEM (DAIS): RELIABILITY AND MAI--ETC(U)
APR 79   A J CZUCHRY, R H KISTLER, J M GLASIER   F33615-75-C-5218
UNCLASSIFIED   AFHRL-TR-78-2(II)   NL

2 OF 2
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A068826

END
DATE
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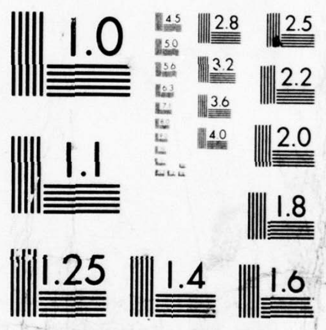
DDC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

```
      SIZES          82
      EQIDS         160
      LABL            8

STATISTICS
  PROGRAM LENGTH              20611B    8585
  BUFFER LENGTH               10260B    4272
  CM LABELED COMMON LENGTH    25762B   11250
          52000B CM USED
```

```
      SUBROUTINE AOUT(AVAIL,SEQID,NSUB)
C
C THIS ROUTINE PRINTS OUT THE AVAIL ARRAY SORTED INCREASING.
C
      DIMENSION AVAIL(NSUB),SEQID(NSUB)
C
      DIMENSION LABEL(8)
      COMMON/LABL/LABEL
C
      WRITE(6,10) LABEL
   10 FORMAT(1H1,8A10//1X42HSUBSYSTEM INHERENT FLIGHTLINE AVAILABILITY/
     * 10HOSUBSYSTEM,5X12HAVAILABILITY/1X9H---------,
     *  5X12H------------/)
C
C SORT AND PRINT
      ATOT=1.0
      DO 50  J=1,NSUB
      WORST=2.0
      DO 30  K=1,NSUB
      IF (AVAIL(K).LT.0.0) GO TO 30
      IF (AVAIL(K).GT.WORST) GO TO 30
      WORST=AVAIL(K)
      JSUB=K
   30 CONTINUE
C
C JSUB NOW CONTAINS NEXT IN LIST
      ATOT=ATOT*AVAIL(JSUB)
      WRITE(6,40) SEQID(JSUB),AVAIL(JSUB)
   40 FORMAT(2XA7,5XF10.4)
   50 AVAIL(JSUB)=-WORST
C
C PRINT OVERALL
      WRITE(6,60) ATOT
   60 FORMAT(33HOSERVICE FLIGHTLINE AVAILABILITY-/14XF10.4)
      RETURN
      END
```

```
          SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
    3  AOUT

VARIABLES      SN  TYPE          RELOCATION
  121  ATOT        REAL                                0  AVAIL      REAL       ARRAY     F.P.
  122  J           INTEGER                           125  JSUB       INTEGER
  124  K           INTEGER                             0  LABEL      INTEGER    ARRAY    LABL
    0  NSUB        INTEGER            F.P.             0  SEQID      REAL       ARRAY     F.P.
  123  WORST       REAL

FILE NAMES         MODE
          TAPE6    FMT
STATEMENT LABELS
   57  10        FMT                 33  30                                        102  40       FMT
    0  50                           111  60      FMT

LOOPS  LABEL     INDEX    FROM-TO    LENGTH    PROPERTIES
   22  50      * J          17 30      27B               EXT REFS  NOT INNER
   27  30        K          19 24       5B      INSTACK

COMMON BLOCKS    LENGTH
         LABL       8

STATISTICS
   PROGRAM LENGTH              140B     96
   CM LABELED COMMON LENGTH     10B      8
           52000B CM USED
```

```
      SUBROUTINE EQUALS (KEY,TEST,IN)
C
C THIS ROUTINE TESTS AN INPUT STRING (TEST) AGAINST A KEY STRING(KEY)
C TO FIND IF THE TEST WORD CONTAINS THE SAME CHARACTERS AS THE KEY
C WORD UP TO BUT NOT INCLUDING THE FIRST BLANK OF THE KEY
C STRING FOLLOWING THE FIRST NON-BLANK.  FOR EXAMPLE, IF THE KEY
C STRING WAS "AC1" AND THE TEST STRING WAS "AC130", THIS ROUTINE
C WOULD RETURN A POSITIVE RESPONSE OF "1" IN "IN" INSTEAD OF "0".
C
      REAL KEY,KEY1
      DIMENSION KEY1(7),TEST1(7)
      DATA BLANK/1H /
C
C INITIALIZE "IN".  JSTART IS SET WHEN THE FIRST NON-BLANK OF THE
C KEY IS FOUND.  A LATER BLANK DENOTES THE END OF THE KEY.
      IN=0
      JSTART=0
C
C PUT THE STRINGS INTO SINGLE CHARACTER ARRAYS.
      DECODE(7,1,KEY) KEY1
      DECODE(7,1,TEST) TEST1
    1 FORMAT(7A1)
C
C LOOP THROUGH EACH OF THE SEVEN CHARACTERS.  A MISMATCH IS A FAILURE.
C WHEN A BLANK IS FOUND IN THE KEY (AFTER A NON-BLANK), THE TEST PASSES.
      DO 10  K=1,7
      IF (KEY1(K).EQ.BLANK) IF(JSTART) 10,10,15
      IF (KEY1(K).NE.TEST1(K)) RETURN
      JSTART=1
   10 CONTINUE
   15 IN=1
      RETURN
      END
```

```
         SYMBOLIC REFERENCE MAP (R=1)

  ENTRY POINTS
      3  EQUALS

  VARIABLES      SN  TYPE         RELOCATION
     32  BLANK       REAL                            0  IN        INTEGER             F.P.
     50  JSTART      INTEGER                        51  K         INTEGER
      0  KEY         REAL              F.P.         52  KEY1      REAL       ARRAY
      0  TEST        REAL              F.P.         61  TEST1     REAL       ARRAY

  STATEMENT LABELS
     45  1        FMT                 25  10                                30  15

  LOOPS   LABEL     INDEX     FROM-TO    LENGTH    PROPERTIES
     14   10        * K         26 30      14B                     EXITS


  STATISTICS
    PROGRAM LENGTH               70B     56
            52000B CM USED
                         SUBROUTINE READ
                  C
                  C THIS ROUTINE READS IN THE BASE FILES.
                  C
                  C
```

```
      SUBROUTINE READ
C
C THIS ROUTINE READS IN THE BASE FILES.
C
C
C FOLLOWING IS DATA ASSOCIATED WITH SUBSYSTEMS. TO ALLOW FOR MORE,CHANGE
C EACH 40 IN THE RIGHTMOST SUBSCRIPT OF THE FOLLOWING SUBSYSTEM ARRAYS
C TO THE DESIRED MAXIMUM.  TO ALLOW FOR MORE AFSC'S PER SUBSYSTEM
C TASK, CHANGE THE FIRST 3 IN THE SFAFSC ARRAY TO THE DESIRED NUMBER.
C TO ALLOW FOR MORE SUPPORT EQUIPMENT PER SUBSYSTEM TASK, CHANGE THE
C 1 IN THE LEFTMOST SUBSCRIPT OF SFSE TO THE DESIRED VALUE.   ALSO
C CHANGE THE 40,5, AND 1 IN THE FIRST CARD BELOW AND THESE COMMENTS.
C
      DIMENSION NUML(40),KLRU(40),TSFL(7,40),PSM(7,40),
     * NSAFSC(7,40),JNAC(40),FHBMA(40),NSFSE(7,40),HFAC(40)
      DIMENSION SWUC(40),SFSE(2,7,40),SFAFSC(5,7,40)
      DIMENSION SNAME(5,40)
      DIMENSION SEQID(40)
      COMMON/SUBS/SNAME,TSFL,PSM,SWUC,SFSE,
     * SFAFSC,NSAFSC,NSFSE,FHBMA,JNAC,HFAC
C
C FOLLOWING IS DATA ASSOCIATED WITH LRU'S.  IN A MANNER SIMILAR
C TO THE ABOVE FOR SUBSYSTEMS, TO ALLOW FOR MORE, CHANGE EACH 120 TO THE
C DESIRED NUMBER.  TO ALLOW FOR MORE AFSC'S PER TASK, CHANGE EACH 3
C IN THE LEFTMOST SUBSCRIPT OF LSAFSC TO THE DESIRED NUMBER. TO CHANGE
C MAX NUMBER OF SUPPORT EQUIPMENT PER TASK, CHANGE THE 1 IN LSE
C TO THE DESIRED NUMBER.  CHANGE THE 120, THE 1 AND
C THE 3 IN THE FIRST CARD FOLLOWING AND IN THESE COMMENTS.
C
     DIMENSION ARRAY(8),LABEL(8)
      REAL LF,LS,MF
      COMMON/LABL/LABEL
      DIMENSION TLSHOP(5,120),NLAFSC(5,120),PLRR(5,120),
     * LDRAW(120),NLSE(5,120),LNAC(120)
```

```
      REAL LSAFSC,LSE
      DIMENSION LWUC(120),LSAFSC(5,5,120),LSE(2,5,120)
      DIMENSION LNAME(5,120)
      REAL LEQID
      DIMENSION LEQID(120)
      COMMON/LRUS/LNAME,TLSHOP,PLRR,LWUC,LSAFSC,
     * LSE,NLAFSC,NLSE,LDRAW,LNAC
C
      COMMON/SIZES/NSUB,NLRU,KLRU,NUML
      COMMON/EQIDS/SEQID,LEQID
C
      DIMENSION TIMES(7),PEAS(7)
      DIMENSION DATA(7)
      DATA BLANK/5H     /
      DATA CR,SF,LF,LS,TS,TF,PF,PS,MF,SS
     * /2HCR,2HSF,2HLF,2HLS,2HTS,2HTF,2HPF,2HPS,2HMF,2HSS/
C
C READ TITLE CARD AND PRINT.
      DATA MAXLRU,MAXLA,MAXLE/120,5,2/
      DATA MAXSUB,MAXSA,MAXSE/40,5,2/
      READ(4,5) LABEL
      WRITE(6,6) LABEL
    5 FORMAT(8A10)
    6 FORMAT(1X8A10)
C
C READ NUMBER OF SUBSYSTEMS.  HALT IF TOO MANY.
      NLRU=0
      READ(4,10) NSUB
10    FORMAT(I2)
      IF (NSUB.LE.MAXSUB) GO TO 30
      WRITE(6,20) MAXSUB
   20 FORMAT(27HOCURRENT MAX SUBSYSTEMS AT ,I2)
      STOP
```

```
C
C READ EACH SUBSYSTEM IN LOOP 100.  READ AND WRITE THE CR CARD.
   30  DO 100  JSUB=1,NSUB
   35  READ(4,40) TYPE,SEQID(JSUB),DASH1,JSEQ1,
     *  SWUC(JSUB),JNAC(JSUB),(SNAME(K,JSUB),K=1,5),NR
   40  FORMAT(A2,1XA7,A1,I1,7XA5,1XI2,1X5A8,6XI2)
       WRITE(6,41) TYPE,SEQID(JSUB),DASH1,JSEQ1,
     *  SWUC(JSUB),JNAC(JSUB),(SNAME(K,JSUB),K=1,5),NR
   41  FORMAT(1XA2,1XA7,A1,I1,7XA5,1XI2,1X5A8,6XI2)
       IF (JSEQ1.EQ.2) GO TO 35
       NUML(JSUB)=NR
       IF(JSEQ1.EQ.1.AND.TYPE.EQ.CR) GO TO 60
       WRITE(6,50)
   50  FORMAT(40HPRECEDING SUBSYSTEM CARD SEQUENCE ERROR.)
C
C SET POINTER FOR THIS SUBSYSTEM TO FIRST LRU IN LRU TABLES.
   60  KLRU(JSUB)=NLRU+1
C
C READ CROSS REFERENCE CARDS FOR EACH LRU IN THIS SUBSYSTEM (LOOP 90).
       DO 90  LDUMMY=1,NR
       IF (NLRU.LT.MAXLRU) GO TO 80
       WRITE(6,70) MAXLRU
   70  FORMAT(21HOCURRENT MAX LRUS AT ,I3)
       STOP
   80  NLRU=NLRU+1
   85  READ(4,40) TYPE,LEQID(NLRU),DASH1,JSEQ1,
     *  LWUC(NLRU),LNAC(NLRU),(LNAME(K,NLRU),K=1,5)
       WRITE(6,41) TYPE,LEQID(NLRU),DASH1,JSEQ1,
     *  LWUC(NLRU),LNAC(NLRU),(LNAME(K,NLRU),K=1,5)
       IF (JSEQ1.EQ.2) GO TO 35
       IF (JSEQ1.EQ.1.AND.TYPE.EQ.CR) GO TO 90
       WRITE(6,86)
   86  FORMAT(34HPRECEDING LRU CARD SEQUENCE ERROR.)
   90  CONTINUE
```

```
  100 CONTINUE
C
C READ MANDATORY SECOND CR CARD FOR LAST LRU
      READ(4,5) ARRAY
      WRITE(6,105) ARRAY
  105 FORMAT(1X8A10)
C
C READ SF CARDS. THERE MAY BE FROM 1 TO MAXSE CARDS PER SUBSYSTEM.
      JSUB=0
      DO 150  K=1,NSUB
      READ(4,110) TYPE,EQ,DASH,JSEQ,DATA,NUM
      WRITE(6,111)TYPE,EQ,DASH,JSEQ,DATA,NUM
  111 FORMAT(1XA2,1XA7,A1,I1,7(1XA5),I3)
  110 FORMAT(A2,1XA7,A1,I1,7(1XA5),I3)
      IF (TYPE.NE.SF) WRITE(6,115) TYPE,SF
  115 FORMAT(1XA2,12H CARD WHERE ,A2,14H CARD BELONGS.)
      IF (JSEQ.GT.1) WRITE(6,116)
  116 FORMAT(21H CARD SEQUENCE ERROR.)
      IF (NUM.GT.MAXSE) WRITE(6,117) MAXSE
  117 FORMAT(24H CURRENT MAX SE'S SET AT,I2)
C
C IF CARDS ARE NOT IN SEQUENCE, WE ADVANCE JSUB UP TO THE CORRECT SUBSYSTEM
      JSUB=JSUB+1
      JFIRST=JSUB
  120 IF(EQ.EQ.SEQID(JSUB)) GO TO 130
      JSUB=JSUB+1
      IF(JSUB.GT.NSUB) JSUB=1
      IF (JSUB.NE.JFIRST) GO TO 120
C IF UNABLE TO IDENTIFY SUBSYSTEM, GO TO THE NEXT.
  125 WRITE(6,126)
  126 FORMAT(28H SUBSYSTEM EQUIP ID INVALID.)
      GO TO 150
C
C ASSIGN TO THE PROPER SUBSYSTEM. FIRST 1 SE, THEN THE 2ND, ETC.
```

```
  130 NSEQ=1
      DO 135  L=1,7
  135 NSFSE(L,JSUB)=0
  137 DO 140  L=1,7
      IF (DATA(L).EQ.BLANK) GO TO 140
      NPOS=NSFSE(L,JSUB)+1
      NSFSE(L,JSUB)=NPOS
      SFSE(NPOS,L,JSUB)=DATA(L)
  140 CONTINUE
      IF (NSEQ.GE.NUM) GO TO 150
C
C READ ADDITIONAL SE'S.  THEN STORE ABOVE.
      NSEQ=NSEQ+1
      READ(4,110) TYPE,EQ,DASH,JSEQ,DATA
      WRITE(6,111) TYPE,EQ,DASH,JSEQ,DATA
      IF (EQ.NE.SEQID(JSUB)) WRITE(6,190)
      IF (TYPE.NE.SF) WRITE(6,115) TYPE,SF
      IF (JSEQ.NE.NSEQ) WRITE(6,116)
      GO TO 137
  150 CONTINUE
C
C READ LF CARDS. THERE MAY BE FROM ONE TO MAXSA CARDS FOR EACH SUBSYSTEM.
      JSUB=0
      DO 200  K=1,NSUB
      READ(4,110) TYPE,EQ,DASH,JSEQ,DATA,NUM
      WRITE(6,111)TYPE,EQ,DASH,JSEQ,DATA,NUM
      IF (TYPE.NE.LF) WRITE(6,115) TYPE,LF
      IF (JSEQ.GT.1) WRITE(6,116)
      IF (NUM.GT.MAXSA) WRITE(6,155) MAXSA
  155 FORMAT(26H CURRENT MAX MPSC'S SET AT,I2)
C
C IF CARDS ARE NOT IN SEQUENCE BY SUBSYSTEM, WE INCREMENT JSUB TO IT.
      JSUB=JSUB+1
      JFIRST=JSUB
```

```
  160 IF (EQ.EQ.SEQID(JSUB)) GO TO 170
      JSUB=JSUB+1
      IF(JSUB.GT.NSUB) JSUB=1
      IF (JSUB.NE.JFIRST) GO TO 160
      WRITE(6,126)
      GO TO 200
C
C ASSIGN TO PROPER SUBSYSTEM, INITIALLY THE FIRST AFSC, THEN SECOND, ETC.
  170 NSEQ=1
      DO 173  L=1,7
  173 NSAFSC(L,JSUB)=0
  175 DO 180  L=1,7
      IF (DATA(L).EQ.BLANK) GO TO 180
      NPOS=NSAFSC(L,JSUB)+1
      NSAFSC(L,JSUB)=NPOS
      SFAFSC(NPOS,L,JSUB)=DATA(L)
  180 CONTINUE
      IF (NSEQ.GE.NUM) GO TO 200
C
C READ ADDITIONAL AFSC'S, THEN STORE SIMILARLY ABOVE.
      NSEQ=NSEQ+1
      READ(4,110) TYPE,EQ,DASH,JSEQ,DATA
      WRITE(6,111)TYPE,EQ,DASH,JSEQ,,DATA
      IF (EQ.NE.SEQID(JSUB)) WRITE(6,190)
  190 FORMAT(22H INVALID EQUIPMENT ID.)
      IF (TYPE.NE.LF) WRITE(6,115) TYPE,LF
      IF (JSEQ.NE.NSEQ) WRITE(6,116)
      GO TO 175
  200 CONTINUE
C
C
C READ LS CARDS. THERE MAY BE FROM ONE TO MAXLA CARDS PER LRU.
      JLRU=0
      DO 260  K=1,NLRU
```

```
      READ(4,210) TYPE,EQ,DASH,JSEQ,DATA,NUM
      WRITE(6,211)TYPE,EQ,DASH,JSEQ,DATA,NUM
  211 FORMAT(1XA2,1XA7,A1,I1,6X7(1XA5),I3)
  210 FORMAT(A2,1XA7,A1,I1,6X7(1XA5),I3)
      IF (TYPE.NE.LS) WRITE(6,115) TYPE,LS
      IF (JSEQ.GT.1) WRITE(6,116)
      IF (NUM.GT.MAXLA) WRITE(6,155) MAXLA
      JLRU=JLRU+1
      JFIRST=JLRU
  220 IF (EQ.EQ.LEQID(JLRU)) GO TO 230
C
C IF CARDS ARE NOT IN SEQUENCE BY LRU, WE INCREMENT JLRU UP TO IT.
      JLRU=JLRU+1
      IF (JLRU.GT.NLRU) JLRU=1
      IF (JLRU.EQ.JFIRST) GO TO 255
      GO TO 220
C
C ASSIGN TO PROPER LRU
  230 NSEQ=1
      DO 235  L=1,5
  266 FORMAT(1XA2,1XA7,A1,I1,6X7(1XF5.1))
  235 NLAFSC(L,JLRU)=0
  240 DO 250  L=1,5
      LX=L
      IF (L.GT.3) LX=L+2
      IF (DATA(LX).EQ.BLANK) GO TO 250
      NPOS=NLAFSC(L,JLRU)+1
      NLAFSC(L,JLRU)=NPOS
      LSAFSC(NPOS,L,JLRU)=DATA(LX)
  250 CONTINUE
      IF (NSEQ.GE.NUM) GO TO 260
C
C READ ADDITIONAL AFSC'S, THEN STORE SIMILARLY ABOVE.
      NSEQ=NSEQ+1
```

```
      READ(4,210) TYPE,EQ,DASH,JSEQ,DATA
      WRITE(6,211)TYPE,EQ,DASH,JSEQ,DATA
      IF (EQ.NE.LEQID(JLRU)) WRITE(6,190)
      IF (TYPE.NE.LS) WRITE(6,115) TYPE,LS
      IF (JSEQ.NE.NSEQ) WRITE(6,116)
      GO TO 240
C
C IF UNABLE TO IDENTIFY EQUIPMENT ID, GO TO THE NEXT.
  255 WRITE(6,256)
  256 FORMAT(22H LRU EQUIP ID INVALID.)
  260 CONTINUE
C
C READ TS CARDS, ONE PER LRU IN ANY ORDER
      JLRU=0
      DO 300  K=1,NLRU
      READ(4,265) TYPE,EQ,DASH,JSEQ,TIMES
      WRITE(6,266)TYPE,EQ,DASH,JSEQ,TIMES
  265 FORMAT(A2,1XA7,A1,I1,6X7(1XF5.1))
      IF (TYPE.NE.TS) WRITE(6,115) TYPE,TS
      IF (JSEQ.GT.1) WRITE(6,116)
C
C IF CARDS ARE NOT IN SEQUENCE BY LRU, WE INCREMENT JLRU UP TO IT.
      JLRU=JLRU+1
      JFIRST=JLRU
  270 IF (EQ.EQ.LEQID(JLRU)) GO TO 280
      JLRU=JLRU+1
      IF (JLRU.GT.NLRU)JLRU=1
      IF (JLRU.NE.JFIRST) GO TO 270
      WRITE(6,256)
      GO TO 300
C
C ASSIGN TO PROPER LRU
  280 DO 290  L=1,3
  290 TLSHOP(L,JLRU)=TIMES(L)
```

```
      TLSHOP(4,JLRU)=TIMES(6)
      TLSHOP(5,JLRU)=TIMES(7)
  300 CONTINUE
C
C READ TF CARDS, ONE PER SUBSYSTEM
      JSUB=0
      DO 340  K=1,NSUB
      READ(4,305) TYPE,EQ,DASH,JSEQ,TIMES
      WRITE(6,306)TYPE,EQ,DASH,JSEQ,TIMES
  306 FORMAT(1XA2,1XA7,A1,I1,7(1XF5.1))
  305 FORMAT(A2,1XA7,A1,I1,7(1XF5.1))
      IF (TYPE.NE.TF) WRITE(6,115) TYPE,TF
      IF (JSEQ.GT.1) WRITE(6,116)
C
C IF CARDS ARE NOT IN SEQUENCE, WE INCREMENT JSUB UP TO IT.
      JSUB=JSUB+1
      JFIRST=JSUB
  310 IF (EQ.EQ.SEQID(JSUB)) GO TO 320
      JSUB=JSUB+1
      IF (JSUB.GT.NSUB) JSUB=1
      IF (JSUB.NE.JFIRST) GO TO 310
      WRITE(6,126)
      GO TO 340
C
C ASSIGN TO PROPER SUBSYSTEM
  320 DO 330  L=1,7
  330 TSFL(L,JSUB)=TIMES(L)
  340 CONTINUE
C
C READ PF CARDS, ONE PER SUBSYSTEM.
      JSUB=0
      DO 390  K=1,NSUB
      READ(4,350) TYPE,EQ,DASH,JSEQ,PEAS
      WRITE(6,351)TYPE,EQ,DASH,JSEQ,PEAS
```

```
  351 FORMAT(1XA2,1XA7,A1,I1,7(F6.4))
  350 FORMAT(A2,1XA7,A1,I1,7(F6.4))
      IF (TYPE.NE.PF) WRITE(6,115) TYPE,PF
      IF (JSEQ.GT.1) WRITE(6,116)
C
C IF CARDS ARE NOT IN SEQUENCE, WE INCREMENT JSUB UP TO IT.
      JSUB=JSUB+1
      JFIRST=JSUB
  360 IF (EQ.EQ.SEQID(JSUB)) GO TO 370
      JSUB=JSUB+1
      IF (JSUB.GT.NSUB) JSUB=1
      IF (JSUB.NE.JFIRST) GO TO 360
      WRITE(6,126)
      GO TO 390
C
C ASSIGN TO PROPER SUBSYSTEM
  370 DO 380  L=1,6
  380 PSM(L,JSUB)=PEAS(L)
  390 CONTINUE
C
C READ PS CARDS, ONE PER LRU IN ANY ORDER
      JLRU=0
      DO 440  K=1,NLRU
      READ(4,400) TYPE,EQ,DASH,JSEQ,PEAS
      WRITE(6,401)TYPE,EQ,DASH,JSEQ,PEAS
  401 FORMAT(1XA2,1XA7,A1,I1,6X7(F6.4))
  400 FORMAT(A2,1XA7,A1,I1,6X7(F6.4))
      IF (TYPE.NE.PS) WRITE(6,115) TYPE,PS
      IF (JSEQ.GT.1) WRITE(6,116)
C
C IF CARDS ARE NOT IN SEQUENCE, WE INCREMENT JLRU TO IT.
      JLRU=JLRU+1
      JFIRST=JLRU
  410 IF (EQ.EQ.LEQID(JLRU)) GO TO 420
```

```
      JLRU=JLRU+1
      IF (JLRU.GT.NLRU) JLRU=1
      IF (JLRU.NE.JFIRST) GO TO 410
      WRITE(6,256)
      GO TO 440
C
C ASSIGN TO PROPER LRU
  420 DO 430  L=1,3
  430 PLRR(L,JLRU)=PEAS(L)
      PLRR(4,JLRU)=PEAS(6)
      PLRR(5,JLRU)=PEAS(7)
  440 CONTINUE
C
C READ SS CARDS, ONE PER LRU.  ADDITIONAL SE'S ON FOLLOWING CARDS.
      JLRU=0
      DO 449  K=1,NLRU
      READ(4,441) TYPE,EQ,DASH,JSEQ,(DATA(J),J=1,3),ND,DATA(4),
     * DATA(5),NUM
      WRITE(6,4411)TYPE,EQ,DASH,JSEQ,(DATA(J),J=1,3),ND,DATA(4),
     * DATA(5),NUM
 4411 FORMAT(1XA2,1XA7,A1,I1,6X3(1XA5),1XI3,8X2(1XA5),1XI2)
  441 FORMAT(A2,1XA7,A1,I1,6X3(1XA5),1XI3,8X2(1XA5),1XI2)
      IF (TYPE.NE.SS) WRITE(6,115) TYPE,SS
      IF (JSEQ.GT.1) WRITE(6,116)
      IF (NUM.GT.MAXLE) WRITE(6,117) MAXLE
      JLRU=JLRU+1
      JFIRST=JLRU
  442 IF (EQ.EQ.LEQID(JLRU)) GO TO 443
C
C IF CARDS ARE NOT IN SEQUENCE, WE INCREMENT JLRU UP TO IT.
      JLRU=JLRU+1
      IF (JLRU.GT.NLRU) JLRU=1
      IF (JLRU.EQ.JFIRST) GO TO 447
      GO TO 442
```

```
C
C ASSIGN TO PROPER LRU
  443 NSEQ=1
      DO 444  L=1,5
  444 NLSE(L,JLRU)=0
      LDRAW(JLRU)=ND
  445 DO 446  L=1,5
      IF (DATA(L).EQ.BLANK) GO TO 446
      NPOS=NLSE(L,JLRU)+1
      NLSE(L,JLRU)=NPOS
      LSE(NPOS,L,JLRU)=DATA(L)
  446 CONTINUE
      IF (NSEQ.GE.NUM) GO TO 449
C
C READ ADDITIONAL SE'S, THEN STORE ABOVE.
      NSEQ=NSEQ+1
      READ(4,441) TYPE,EQ,DASH,JSEQ,(DATA(J),J=1,3),ND,DATA(4),DATA(5)
      WRITE(6,4411)TYPE,EQ,DASH,JSEQ,(DATA(J),J=1,3),ND,DATA(4),DATA(5)
      IF (EQ.NE.LEQID(JLRU)) WRITE(6,190)
      IF (TYPE.NE.SS) WRITE(6,115) TYPE,SS
      IF (JSEQ.NE.NSEQ) WRITE(6,116)
      GO TO 445
C
C IF UNABLE TO IDENTIFY EQUIPMENT, GO TO THE NEXT.
  447 WRITE(6,256)
  449 CONTINUE
C
C
C READ MF CARDS, 1 PER SUBSYSTEM IN ANY ORDER
      JSUB=0
      DO 480  K=1,NSUB
      READ(4,450) TYPE,EQ,DASH,JSEQ,VAL,H
  450 FORMAT(A2,1XA7,A1,I1,1XF6.1,1XF6.4)
      WRITE(6,451) TYPE,EQ,DASH,JSEQ,VAL,H
```

```
  451 FORMAT(1XA2,1XA7,A1,I1,1XF6.1,1XF6.4)
      IF (TYPE.NE.MF) WRITE(6,115) TYPE,MF
      IF (JSEQ.GT.1) WRITE(6,116)
C
C IF CARDS ARE NOT IN SEQUENCE, INCREMENT JSUB UP TO IT.
      JSUB=JSUB+1
      JFIRST=JSUB
  460 IF (EQ.EQ.SEQID(JSUB)) GO TO 470
      JSUB=JSUB+1
      IF (JSUB.GT.NSU3) JSUB=1
      IF (JSUB.NE.JFIRST) GO TO 460
      WRITE(6,126)
      GO TO 480
C
C ASSIGN TO PROPER SUBSYSTEM
  470 FHBMA(JSUB)=VAL
      HFAC(JSUB)=H+1.0
  480 CONTINUE
C
      RETURN
      END
```

```
         SYMBOLIC REFERENCE MAP (R=1)

 ENTRY POINTS
     1   READ

 VARIABLES       SN  TYPE            RELOCATION
  2360   ARRAY        REAL       ARRAY                      1131   BLANK      REAL
  1132   CR           REAL                                  2343   DASH       REAL
  2335   DASH1        REAL                                  2406   DATA       REAL       ARRAY
  2342   EQ           REAL                                  6370   FHBMA      REAL       ARRAY     SUBS
  2357   H            REAL                                  6510   HFAC       REAL       ARRAY     SUBS
  2354   J            INTEGER                               2345   JFIRST     INTEGER
  2352   JLRU         INTEGER                               6440   JNAC       INTEGER    ARRAY     SUBS
  2344   JSEQ         INTEGER                               2336   JSEQ1      INTEGER
  2333   JSUB         INTEGER                               2337   K          INTEGER
     2   KLRU         INTEGER    ARRAY     SIZES            2350   L          INTEGER
     0   LABEL        INTEGER    ARRAY     LABL            16230   LDRAW      INTEGER    ARRAY     LRUS
  2341   LDUMMY       INTEGER                                 50   LEQID      REAL       ARRAY     EQIDS
  1134   LF           REAL                                 16420   LNAC       INTEGER    ARRAY     LRUS
     0   LNAME        INTEGER    ARRAY     LRUS             1135   LS         REAL
  3600   LSAFSC       REAL       ARRAY     LRUS            11470   LSE        REAL       ARRAY     LRUS
  3410   LWUC         INTEGER    ARRAY     LRUS             2353   LX         INTEGER
  1145   MAXLA        INTEGER                               1146   MAXLE      INTEGER
 VARIABLES       SN  TYPE            RELOCATION
  1144   MAXLRU       INTEGER                               1150   MAXSA      INTEGER
  1151   MAXSE        INTEGER                               1147   MAXSUB     INTEGER
  1142   MF           REAL                                  2355   ND         INTEGER
 13750   NLAFSC       INTEGER    ARRAY     LRUS                1   NLRU       INTEGER              SIZES
 15100   NLSE         INTEGER    ARRAY     LRUS             2351   NPOS       INTEGER
  2340   NR           INTEGER                               5310   NSAFSC     INTEGER    ARRAY     SUBS
  2347   NSEQ         INTEGER                               5740   NSFSE      INTEGER    ARRAY     SUBS
     0   NSUB         INTEGER              SIZES            2345   NUM        INTEGER
```

```
  52  NUML      INTEGER   ARRAY    SIZES             2377  PEAS     REAL     ARRAY
1140  PF        REAL                                 2260  PLRR     REAL     ARRAY    LRU:
1141  PS        REAL                                  740  PSM      REAL     ARRAY    SUB:
   0  SEQID     REAL      ARRAY    EQIDS             1133  SF       REAL
2520  SFAFSC    REAL      ARRAY    SUBS              1440  SFSE     REAL     ARRAY    SUB:
   0  SNAME     REAL      ARRAY    SUBS              1143  SS       REAL
1370  SWUC      REAL      ARRAY    SUBS              1137  TF       REAL
2370  TIMES     REAL      ARRAY                      1130  TLSHOP   REAL     ARRAY    LRU:
1136  TS        REAL                                  310  TSFL     REAL     ARRAY    SUB:
2334  TYPE      REAL                                 2356  VAL      REAL

FILE NAMES      MODE
      TAPE4     FMT                TAPE6     FMT

STATEMENT LABELS
1163  5      FMT              1165  6      FMT             1174  10     FMT
1202  20     FMT                16  30                       17  35
1223  40     FMT              1243  41     FMT             1253  50     FMT
  57  60                      1265  70     FMT               67  80
  71  85                      1321  86     FMT              127  90
   0  100                     1337  105    FMT             1370  110    FMT
1364  111    FMT              1401  115    FMT             1412  116    FMT
1422  117    FMT               164  120                       0  125       INACTIVE
1432  126    FMT               176  130                       0  135
 207  137                      224  140                     252  150
1532  155    FMT               301  160                     313  170
   0  173                      324  175                     342  180
1566  190    FMT               370  200                    1631  210    FMT
1625  211    FMT               417  220                     427  230
   0  235                      440  240                     461  250
 510  255                     1714  256    FMT              512  260
1741  265    FMT              1651  266    FMT              535  270
 547  280                        0  290                     563  300
2005  305    FMT              2001  306    FMT              606  310
```

```
 620  320                      0  330                  630  340
2051  350   FMT             2045  351   FMT            653  360
 665  370                      0  380                  675  390
2115  400   FMT             2111  401   FMT            720  410
 732  420                      0  430                  746  440
2173  441   FMT              775  442                 1005  443
   0  444                   1020  445                 1034  444
1062  447                   1064  449                 2274  450    FMT
2311  451   FMT             1107  460                 1121  470
1125  480                   2165  4411  FMT
LOOPS  LABEL   INDEX     FROM-TO    LENGTH   PROPERTIES
  17   100   * JSUB       70 102     115B                EXT REFS  NOT INNER
  62   90    * LDUMMY     87 101      50B                EXT REFS
 142   150   * K         111 155     113B                EXT REFS  NOT INNER
LOOPS  LABEL   INDEX     FROM-TO    LENGTH   PROPERTIES
 204   135     L         137 138       2B     INSTACK
 216   140     L         139 144       7B     INSTACK
 257   200   * K         159 198     114B                EXT REFS  NOT INNER
 321   173     L         179 180       2B     INSTACK
 333   180     L         181 186      10B       OPT
 375   260   * K         203 248     120B                EXT REFS  NOT INNER
 435   235     L         223 225       2B     INSTACK
 447   250     L         226 233      14B       OPT
 517   300   * K         252 274      47B                EXT REFS  NOT INNER
 554   290     L         270 271       2B     INSTACK
 570   340   * K         278 299      43B                EXT REFS  NOT INNER
 625   330     L         297 298       2B     INSTACK
 635   390   * K         303 324      43B                EXT REFS  NOT INNER
 672   380     L         322 323       2B     INSTACK
 702   440   * K         328 351      47B                EXT REFS  NOT INNER
 737   430     L         347 348       2B     INSTACK
 753   449   * K         355 399     114B                EXT REFS  NOT INNER
```

```
1013  444       L        377 378       2B      INSTACK
1026  446       L        380 385       7B      INSTACK
1071  480     * K        404 425      37B                EXT REFS

COMMON BLOCKS   LENGTH
       SUBS      3440
       LABL         8
       LRUS      7560
       SIZES       82
       EQIDS      160

STATISTICS
  PROGRAM LENGTH               2415B     1293
  CM LABELED COMMON LENGTH    25762B    11250
          52000B CM USED
```

```
      SUBROUTINE ADDUP(ASUB,ALRU)
C
C THIS ROUTINE ADDS UP THE VARIOUS COLUMNS AND ROWS OF THE DATA
C ROW PASSED TO ARRAYS ASUB AND ALRU, WHICH ARE EITHER ARRAYS
C TTR AND TTRL OR EMMH AND EMMHL.     WHEN ADDING
C SUBSYSTEMS OR LRUS, CHANGE THE 40'S IN THE FIRST CARD BELOW TO
C THE NEW NUMBER OF SUBSYSTEMS.  CHANGE THE 120 IN THE 2ND CARD
C BELOW TO THE NEW MAXIMUM NUMBER OF LRU'S.  ALSO CHANGE THE
C NUMBERS IN THESE COMMENTS.
C
      DIMENSION ASUB(21,40),KLRU(40),NUML(40)
      DIMENSION ALRU(6,4,120)
C
      COMMON/SIZES/NSUB,NLRU,KLRU,NUML
C
C ADD UP LRU TOTALS
      DO 100  JLRU=1,NLRU
      DO 90  M=1,3
      DO 80  N=1,5
      VAL = ALRU(N,M,JLRU)
      ALRU(6,M,JLRU) = ALRU(6,M,JLRU) + VAL
   80 ALRU(N,4,JLRU) = ALRU(N,4,JLRU) + VAL
   90 CONTINUE
      DO 100  N=1,5
  100 ALRU(6,4,JLRU) = ALRU(6,4,JLRU) + ALRU(N,4,JLRU)
C
C ADD UP SUBSYSTEM TOTALS
      DO 140  JSUB=1,NSUB
      JLRU=KLRU(JSUB)
      NR=NUML(JSUB)
C
      DO 120  K=1,NR
      DO 110  N=1,5
  110 ASUB(N,JSUB) = ASUB(N,JSUB) + ALRU(N,4,JLRU)
      ASUB(15,JSUB)=ASUB(15,JSUB)+ALRU(6,4,JLRU)
```

```
      DO 115  M=1,3
  115 ASUB(M+15,JSUB) = ASUB(M+15,JSUB) + ALRU(5,M,JLRU)
  120 JLRU=JLRU+1
      DO 130  N=1,4
  130 ASUB(6,JSUB) = ASUB(6,JSUB) + ASUB(N,JSUB)
      ASUB(13,JSUB)=ASUB(7,JSUB)+ASUB(8,JSUB)+ASUB(1,JSUB)
      ASUB(14,JSUB) = ASUB(9,JSUB) + ASUB(2,JSUB)
      ASUB(19,JSUB) = ASUB(7,JSUB) + ASUB(10,JSUB)
      ASUB(20,JSUB) = ASUB(8,JSUB) + ASUB(9,JSUB) +
     *                  ASUB(11,JSUB) + ASUB(12,JSUB)
C
      DO 135  K=1,6
  135 ASUB(15,JSUB) = ASUB(15,JSUB) + ASUB(K+6,JSUB)
  140 ASUB(21,JSUB) = ASUB(15,JSUB) - ASUB(5,JSUB)
C
      RETURN
      END
```

```
          SYMBOLIC REFERENCE MAP (R=11)

   ENTRY POINTS
       3  ADDUP

   VARIABLES      SN  TYPE           RELOCATION
       0  ALRU        REAL       ARRAY    F.P.             0  ASUB        REAL      ARRAY     F.P.
     170  JLRU        INTEGER                            174  JSUB        INTEGER
     176  K           INTEGER                              2  KLRU        INTEGER   ARRAY     SIZES
     171  M           INTEGER                            172  N           INTEGER
       1  NLRU        INTEGER             SIZES          175  NR          INTEGER
       0  NSUB        INTEGER             SIZES           52  NUML        INTEGER   ARRAY     SIZES
     173  VAL         REAL

   STATEMENT LABELS
       0  80                                   0  90                                   0  100
       0  110                                  0  115                                  0  120
       0  130                                  0  135                                  0  140

   LOOPS  LABEL     INDEX     FROM-TO     LENGTH     PROPERTIES
      16  100     * JLRU        17 25        35B               NOT INNER
      17  90      * M           18 23        21B               NOT INNER
      30  80        N           19 22         4B      INSTACK
      45  100       N           24 25         3B      INSTACK
      54  140     * JSUB        28 49       112B               NOT INNER
      60  120     * K           32 38        42B               NOT INNER
      71  110       N           33 34         3B      INSTACK
     112  115       M           36 37         3B      INSTACK
     130  130       N           39 40         3B      INSTACK
     155  135       K           47 48         3B      INSTACK
```

```
COMMON BLOCKS    LENGTH
       SIZES         82

STATISTICS
  PROGRAM LENGTH                  224B    148
  CM LABELED COMMON LENGTH        122B     82
          52000B CM USED
```

```
      SUBROUTINE SEDUMP(TTRL,TTR,NWANT,WANT)
C THIS ROUTINE DUMPS TO THE PRINTER ALL THE SUPPORT EQUIPMENT REPORTS
C AFTER READING IN THE SUPPORT EQUIPMENTS OF INTEREST.
C
      DIMENSION NUML(40),KLRU(40),TSFL(7,40),PSM(7,40),HFAC(40),
     * NSAFSC(7,40),FHBMA(40),JNAC(40),NSFSE(7,40),AVAIL(40)
      DIMENSION SWUC(40),SFSE(2,7,40),SFAFSC(5,7,40)
      DIMENSION SNAME(5,40)
      DIMENSION SEQID(40)
      COMMON/SUBS/SNAME,TSFL,PSM,SWUC,SFSE,
     * SFAFSC,NSAFSC,NSFSE,FHBMA,JNAC,HFAC
C
      DIMENSION LDRAW(120),LNAC(120),TLSHOP(5,120),NLAFSC(5,120)
      DIMENSION PLRR(5,120),NLSE(5,120)
      REAL LSAFSC,LSE
      DIMENSION LWUC(120),LSAFSC(5,5,120),LSE(2,5,120)
      DIMENSION LNAME(5,120)
      REAL LEQID
      DIMENSION LEQID(120)
      COMMON/LRUS/LNAME,TLSHOP,PLRR,LWUC,LSAFSC,
     * LSE,NLAFSC,NLSE,LDRAW,LNAC
C
      COMMON/SIZES/NSUB,NLRU,KLRU,NUML
      COMMON/EQIDS/SEQID,LEQID
C
      DIMENSION LABEL(8)
      COMMON/LABL/LABEL
C
C
      DIMENSION WANT(100)
C
      DIMENSION ESSE(3,4),GT(3,4),TOTSE(3,4)
      DIMENSION SES(50),ARRAY(13)
```

```
      DIMENSION TTRL(6,4,120),TTR(21,40)
     DATA BLANK,ALLSE/5H     ,5HALLSE/
      IANY=0
C
      READ(4,10) NSES
   10 FORMAT(I2)
      I=0
      IF (NSES.EQ.0) RETURN
      IF (NSES.LT.51) GO TO 20
      WRITE(6,15) NSES
   15 FORMAT( 1XI3,35H SE"S IS MORE THAN CURRENT LIMIT OF,I3)
      STOP
   20 READ(4,30) ARRAY
   30 FORMAT(13(A5,1X))
      WRITE(6,31) ARRAY
   31 FORMAT(1X13(A5,1X))
C
      J=0
   40 J=J+1
      IF (J.GT.13) GO TO 20
      IF (ARRAY(J).EQ.BLANK) GO TO 40
      I=I+1
      SES(I)=ARRAY(J)
      IF (I.LT.NSES) GO TO 40
C
C LOOP THROUGH SE"S OF INTEREST
      DO 160  N=1,NSES
      SE=SES(N)
      DO 41  LL=1,NWANT
      IF (WANT(LL).EQ.SE.OR.WANT(LL).EQ.ALLSE) GO TO 411
   41 CONTINUE
      GO TO 160
  411 DO 42  II=1,4
      DO 42  JJ=1,3
```

```
   42 GT(JJ,II)=0.0
      UPGT=0.0
      WRITE(6,43) SE,LABEL
   43 FORMAT(4H1SE-,A5,10X,8A10/4X5H-----)
      WRITE(6,44)
   44 FORMAT(21X6H-MTTR-,21X5H-MMH-,19X
     * 13H-MMH/1000 FH-,14X14H-MTTR/1000 FH-/
     *  /8X3HTD#,1X,
     * 4(1X22HTD REP  TS REP   TOTAL,4X),6X6HUP/KFH,
     * /8X3H---,1X
     * 4(1X22H------  ------   -----,4X),6X6H------/)
      LINE=7
C
      DO 150  JSUB=1,NSUB
      JLRU=KLRU(JSUB)
      NR=NUML(JSUB)
      IF (LINE+NR.LE.58) GO TO 444
      WRITE(6,443)
  443 FORMAT(1H1)
      WRITE(6,44)
      LINE=7
C
C ZERO OUT TOTAL ARRAY FOR EACH SUBSYSTEM.
  444 DO 45 II=1,3
      DO 45 JJ=1,4
   45 TOTSE(II,JJ)=0.0
      TTRX=0.0
      IP=0
C
C LOOP THROUGH EACH LRU IN THIS SUBSYSTEM.
      DO 140  K=1,NR
      NL4J=NLSE(4,JLRU)
      DO 47  KK=1,NL4J
      IF (SE.EQ.LSE(KK,4,JLRU)) GO TO 60
```

```
   47 CONTINUE
      GO TO 140
C
C COMPUTE FOMS
   60 ESSE(1,1)=PLRR(4,JLRU)*TLSHOP(4,JLRU)
      ESSE(2,1)=PLRR(5,JLRU)*TLSHOP(5,JLRU)
      ESSE(3,1)=ESSE(1,1)+ESSE(2,1)
      ESSE(1,2)=ESSE(1,1)*NLAFSC(4,JLRU)
      ESSE(2,2)=ESSE(2,1)*NLAFSC(5,JLRU)
      ESSE(3,2)=ESSE(1,2)+ESSE(2,2)
      FACT=1000./FHBMA(JSUB)
      DO 65  II=1,3
      ESSE(II,3)=ESSE(II,2)*FACT
   65 ESSE(II,4)=ESSE(II,1)*FACT
C
C SET UP SUBSYSTEM TOTAL ARRAY
      DO 68  II=1,3
      DO 68  JJ=1,4
   68 TOTSE(II,JJ)=TOTSE(II,JJ)+ESSE(II,JJ)
C
C PRINT LRU LINE
      TTRLX=TTRL(5,4,JLRU)*FACT
      TTRX=TTRX+TTRLX
      WRITE(6,70) LEQID(JLRU),LDRAW(JLRU),ESSE,TTRLX
   70 FORMAT(1XA7,I3,4(3F8.4,3X),F13.5)
      IP=1
      IANY=1
      LINE=LINE+1
C
  140 JLRU=JLRU+1
      IF (IP.EQ.0) GO TO 150
C
C PRINT TOTALS
      UPGT=UPGT+TTRX
```

```
      WRITE(6,145) SEQID(JSUB),TOTSE,TTRX
  145 FORMAT(11X,4(3(2X6H------),3X),6X7H-------/
     * 1XA7,3X4(3F8.4,3X),F13.5//)
      LINE=LINE+3
      DO 147  II=1,3
      DO 147  JJ=1,4
  147 GT(II,JJ)=GT(II,JJ)+TOTSE(II,JJ)
  150  CONTINUE
  160 IF (IANY.EQ.1) WRITE(6,170) GT,UPGT
  170 FORMAT(//11X4(3(2X6H------),3X),6X7H-------
     * /1X5HTOTAL,5X4(3F8.4,3X),F13.5)
      RETURN
      END
```

```
         SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
     3   SEDUMP

VARIABLES       SN  TYPE           RELOCATION
   272   ALLSE       REAL                                  673   ARRAY      REAL       ARRAY
   475   AVAIL       REAL       *UNDEF                     271   BLANK      REAL
   545   ESSE        REAL        ARRAY                     473   FACT       REAL
  6370   FHBMA       REAL        ARRAY    SUBS             561   GT         REAL       ARRAY
  6510   HFAC        REAL        ARRAY    SUBS             452   I          INTEGER
   450   IANY        INTEGER                               457   II         INTEGER
   467   IP          INTEGER                               453   J          INTEGER
   460   JJ          INTEGER                               464   JLRU       INTEGER
  6440   JNAC        INTEGER     ARRAY    SUBS             463   JSUB       INTEGER
   470   K           INTEGER                               472   KK         INTEGER
     2   KLRU        INTEGER     ARRAY    SIZES              0   LABEL      INTEGER    ARRAY   LABL
 16230   LDRAW       INTEGER     ARRAY    LRUS              50   LEQID      REAL       ARRAY   EQIDS
VARIABLES       SN  TYPE           RELOCATION
   462   LINE        INTEGER                               456   LL         INTEGER
 16420   LNAC        INTEGER     ARRAY    LRUS               0   LNAME      INTEGER    ARRAY   LRUS
  3600   LSAFSC      REAL        ARRAY    LRUS           11470   LSE        REAL       ARRAY   LRUS
  3410   LWUC        INTEGER     ARRAY    LRUS             454   N          INTEGER
 13750   NLAFSC      INTEGER     ARRAY    LRUS               1   NLRU       INTEGER            SIZES
 15100   NLSE        INTEGER     ARRAY    LRUS             471   NL4J       INTEGER
   465   NR          INTEGER                              5310   NSAFSC      INTEGER    ARRAY   SUBS
   451   NSES        INTEGER                              5740   NSFSE      INTEGER    ARRAY   SUBS
     0   NSUB        INTEGER              SIZES             52   NUML       INTEGER    ARRAY   SIZES
     0   NWANT       INTEGER               F.P.           2260   PLRR       REAL       ARRAY   LRUS
   740   PSM         REAL        ARRAY    SUBS             455   SE         REAL
     0   SEQID       REAL        ARRAY    EQIDS            611   SES        REAL       ARRAY
  2520   SFAFSC      REAL        ARRAY    SUBS            1440   SFSE       REAL       ARRAY   SUBS
     0   SNAME       REAL        ARRAY    SUBS            1370   SWUC       REAL       ARRAY   SUBS
  1130   TLSHOP      REAL        ARRAY    LRUS             575   TOTSE      REAL       ARRAY
```

```
 310  TSFL       REAL       ARRAY     SUBS              0  TTR        REAL      ARRAY      F.P.
   0  TTRL       REAL       ARRAY     F.P.            474  TTRLX      REAL
 466  TTRX       REAL                                 461  UPGT       REAL
   0  WANT       REAL       ARRAY     F.P.

FILE NAMES            MODE
      TAPE4          FMT              TAPE6         FMT

STATEMENT LABELS
 300  10        FMT                   306  15       FMT                          26   20
 321  30        FMT                   330  31       FMT                          33   40
   0  41                                0  42                                   340   43          FMT
 347  44        FMT                     0  45                                     0   47
 145  60                                0  65                                     0   68
 410  70        FMT                   224  140                                  422   145         FMT
   0  147                             256  150                                  261   160
 436  170       FMT                    61  411                                  374   443         FMT
 114  444

LOOPS  LABEL     INDEX      FROM-TO     LENGTH     PROPERTIES
   45  160     * N          60 144       223B                 EXT REFS  NOT INNER
   50  41      * LL         62 64         10B          OPT      EXITS
   62  42      * II         66 68         12B                 NOT INNER
   67  42        JJ         67 68          2B       INSTACK
  102  150     * JSUB       81 143       157B                 EXT REFS  NOT INNER
  115  45      * II         91 93         13B                 NOT INNER
  122  45        JJ         92 93          2B       INSTACK
  132  140     * K          98 131        76B                 EXT REFS  NOT INNER
  136  47      * KK        100 102         7B       INSTACK     EXITS
  165  65        II        113 115         4B       INSTACK
  173  68      * II        118 120        14B                 NOT INNER
  200  68        JJ        119 120         3B       INSTACK
  242  147     * II        140 142        14B                 NOT INNER
  247  147       JJ        141 142         3B       INSTACK
```

```
COMMON BLOCKS    LENGTH
       SUBS        3440
       LRUS        7560
       SIZES         82
       EQIDS        160
       LABL           8
STATISTICS
  PROGRAM LENGTH                720B      464
  CM LABELED COMMON LENGTH    25762B    11250
          52000B CM USED
```

```
      SUBROUTINE DUMP(TITLE,HEADER,JSUB,FACTOR,ASUB,ALRU)
C
C THIS ROUTINE DUMPS THE VARIOUS COLUMNS AND ROWS OF THE DATA
C ELEMENTS ASUB AND ALRU PASSED AS ARGUMENTS, WHICH ARE EITHER ARRAYS
C TTR AND TTRL OR EMMH AND EMMHL.  WHEN ADDING SUBSYSTEMS OR
C LRU'S, CHANGE THE 40'S IN THE 1ST CARD BELOW TO THE NEW NUMBER OF
C SUBSYSTEMS.  CHANGE THE 120'S IN THE SECOND CARD BELOW TO THE NEW
C MAXIMUM NUMBER OF LRU'S.  ALSO CHANGE THE NUMBERS IN THESE COMMENTS.
C
      DIMENSION NUML(40),KLRU(40),TSFL(7,40),PSM(7,40),HFAC(40),
     * NSAFSC(7,40),FHBMA(40),JNAC(40),NSFSE(7,40),AVAIL(40)
      DIMENSION SWUC(40),SFSE(2,7,40),SFAFSC(5,7,40)
      DIMENSION SNAME(5,40)
      COMMON/SUBS/SNAME,TSFL,PSM,SWUC,SFSE,
     * SFAFSC,NSAFSC,NSFSE,FHBMA,JNAC,HFAC
      DIMENSION LDRAW(120),LNAC(120),TLSHOP(5,120),NLAFSC(5,120)
      DIMENSION PLRR(5,120),NLSE(5,120)
      REAL LSAFSC,LSE
      DIMENSION LWUC(120),LSAFSC(5,5,120),LSE(2,5,120)
      DIMENSION LNAME(5,120)
      COMMON/LRUS/LNAME,TLSHOP,PLRR,LWUC,LSAFSC,
     * LSE,NLAFSC,NLSE,LDRAW,LNAC
      DIMENSION ASUB(21),SEQID(40)
      DIMENSION ALRU(6,4,120)
      DIMENSION LEQID(120)
      REAL LEQID
      DIMENSION X(6,4),Y(21)
C
      COMMON/SIZES/NSUB,NLRU,KLRU,NUML
      COMMON/EQIDS/SEQID,LEQID
C
      DIMENSION WKN(4)
C
      DIMENSION FLRU(14),FFL(14),FTOT(5),ALL(33),FIELD(6)
      EQUIVALENCE (ALL(1),FLRU(1)),(ALL(29),FTOT(1)),(ALL(15),FFL(1))
```

```
C
      COMMON/LABL/LABEL
      DIMENSION LABEL(8)
C
      DIMENSION TITLE(5),IND(10)
      DATA WKN/3H  W,3H  K,3H  N,3HSUB/
      DATA FLRU/5H( 3(/,8H4XA3,1X4,4HF8.4,5H,24X2,
     * 4HF8.4,8H)/8X4(1X,8H7(1H-)),,8H24X2(1X7,7H(1H-))/,
     * 8H4XA3,1X4,4HF8.4,5H,24X2,4HF8.4,1H)/
      DATA FFL/5H(//4X,8H3HCND,1X,4HF8.4,6H,2(24X,4HF8.4,8H)/6X1HM,,
     * 3H1X2,4HF8.4,5H,24X2,4HF8.4,3H,8X,4HF8.4,8H/8X9(1X7,
     * 8H(1H-))) /
      DATA FTOT/4H(1X7,8HHTOT/TSK,4H,1X9,4HF8.4,1H)/
C
      DATA FIELD/8H(1XF7.5),8H(1XF7.4),8H(1XF7.3),8H(1XF7.2),
     * 8H(1XF7.1),8H(1XF7.0)/
C
      DATA IND/3,5,11,13,17,19,22,24,26,32/
C
      IF (ASUB(15).EQ.0.0) RETURN
C
C
C COPY ARRAYS, MULTIPLYING BY REQUIRED FACTOR.
      DO 5  K=1,21
    5 Y(K)=ASUB(K)*FACTOR
C
C SET UP FORMAT FIELDS FOR CORRECT WIDTHS
      JF=ALOG10(Y(15))+1
      IF (JF.LT.1) JF=1
      IF (JF.GT.6) JF=6
      DO 8  K=1,10
      I=IND(K)
    8 ALL(I)=FIELD(JF)
```

```
    8  ALL(I)=FIELD(JF)
C
C WRITE TITLE,HEADER AND HEADER LINES.
       WRITE(6,10) TITLE,HEADER,LABEL
   10  FORMAT(1H1,5A4,A5,10X8A10)
       IF (JSUB.GT.0) WRITE(6,12) SEQID(JSUB),SWUC(JSUB),
     *  (SNAME(J,JSUB),J=1,5),FHBMA(JSUB)
   12  FORMAT(11HOSUBSYSTEM-,A7,5X1H(,A5,1H),5X5A8,5X7HMFHBMA=,F6.1)
       WRITE(6,14)
   14  FORMAT(/9X31HAGE F/L  TS F/L     R+R     VR+R ,
     *  40H CND A/C  M A/C   VM A/C   SHOP  TOT/OUT/
     *  9X31H-------  ------   ---    ---- ,
     *  40H -------  -----  ------  ----  -------)
C BYPASS LRUS
       IF (JSUB.EQ.0) GO TO 40
       JLRU=KLRU(JSUB)
       NR=NUML(JSUB)
       KICK=0
       DO 30  K=1,NR
       IF (ALRU(6,4,JLRU).EQ.0.0) GO TO 30
       KICK=KICK+1
       IF (KICK.LE.6) GO TO 18
       WRITE(6,16)
   16  FORMAT(1H1)
       KICK=0
C
C COPY ARRAYS, MULTIPLYING BY REQUIRED FACTOR.
   18  DO 20  N=1,6
       DO 20  M=1,4
   20  X(N,M)=ALRU(N,M,JLRU)*FACTOR
       WRITE(6,25) LEQID(JLRU),LWUC(JLRU),(LNAME(J,JLRU),J=1,5)
   25  FORMAT(/1X4HLRU-,A7,5X1H(,A5,1H),5X5A8)
       WRITE(6,FLRU) (WKN(M),(X(N,M),N=1,6),M=1,4)
   30  JLRU=JLRU+1
       WRITE(6,FFL) Y(7),Y(10),Y(19),Y(8),Y(9),Y(11),Y(12),Y(20)
   40  WRITE(6,FTOT) Y(13),Y(14),Y(3),Y(4),Y(10),Y(11),Y(12),Y(5),Y(15)
       RETURN
       END
```

```
      SYMBOLIC REFERENCE MAP (R=1)
ENTRY POINTS
    3  DUMP

VARIABLES      SN  TYPE            RELOCATION
  327  ALL         REAL       ARRAY                   0  ALRU        REAL       ARRAY     F.P.
    0  ASUB        REAL       ARRAY       F.P.      370  AVAIL       REAL      *UNDEF
    0  FACTOR      REAL                   F.P.      345  FFL         REAL       ARRAY
 6370  FHBMA       REAL       ARRAY     SUBS        521  FIELD       REAL       ARRAY
  327  FLRU        REAL       ARRAY                 363  FTOT        REAL       ARRAY
    0  HEADER      REAL                   F.P.     6510  HFAC        REAL       ARRAY     SUBS
  320  I           INTEGER                          527  IND         INTEGER    ARRAY
  321  J           INTEGER                          317  JF          INTEGER
  322  JLRU        INTEGER                         6440  JNAC        INTEGER    ARRAY     SUBS
    0  JSUB        INTEGER                F.P.      316  K           INTEGER
  324  KICK        INTEGER                            2  KLRU        INTEGER    ARRAY     SIZES
    0  LABEL       INTEGER    ARRAY     LABL      16230  LDRAW       INTEGER    ARRAY     LRUS
   50  LEQID       REAL       ARRAY     EQIDS     16420  LNAC        INTEGER    ARRAY     LRUS
    0  LNAME       INTEGER    ARRAY     LRUS       3600  LSAFSC      REAL       ARRAY     LRUS
11470  LSE         REAL       ARRAY     LRUS       3410  LWUC        INTEGER    ARRAY     LRUS
  326  M           INTEGER                          325  N           INTEGER
13750  NLAFSC      INTEGER    ARRAY     LRUS          1  NLRU        INTEGER              SIZES
15100  NLSE        INTEGER    ARRAY     LRUS        323  NR          INTEGER
 5310  NSAFSC      INTEGER    ARRAY     SUBS       5740  NSFSE       INTEGER    ARRAY     SUBS
    0  NSUB        INTEGER              SIZES        52  NUML        INTEGER    ARRAY     SIZES
 2260  PLRR        REAL       ARRAY     LRUS        740  PSM         REAL       ARRAY     SUBS
    0  SEQID       REAL       ARRAY     EQIDS      2520  SFAFSC      REAL       ARRAY     SUBS
 1440  SFSE        REAL       ARRAY     SUBS          0  SNAME       REAL       ARRAY     SUBS
 1370  SWUC        REAL       ARRAY     SUBS          0  TITLE       REAL       ARRAY     F.P.
 1130  TLSHOP      REAL       ARRAY     LRUS        310  TSFL        REAL       ARRAY     SUBS
  515  WKN         REAL       ARRAY                 440  X           REAL       ARRAY
  470  Y           REAL       ARRAY
```

```
FILE NAMES       MODE
       TAPE6     FMT

EXTERNALS          TYPE    ARGS
      ALOG10     REAL       1 LIBRARY

STATEMENT LABELS
    0  5                              0  8                                172  10       FMT
  204  12        FMT                216  14       FMT                      243  16       FMT
  102  18                             0  20                               253  25       FMT
  151  30                           157  40

LOOPS  LABEL     INDEX     FROM-TO    LENGTH     PROPERTIES
   22  5           K         59 60        3B      INSTACK
   41  8           K         66 68        4B      INSTACK
   72  30        * K         86 101      63B               EXT REFS  NOT INNER
  103  20        * N         95 97       17B               NOT INNER
  114  20          M         96 97        3B      INSTACK
  136            * M        100 100      12B               EXT REFS

COMMON BLOCKS    LENGTH
       SUBS        3440
       LRUS        7560
       SIZES         82
       EQIDS        160
COMMON BLOCKS    LENGTH
       LABL           8

STATISTICS
  PROGRAM LENGTH                557B      367
  CM LABELED COMMON LENGTH    25762B    11250
       52000B CM USED
```

```
      SUBROUTINE DUMP2(M,ASUB)
C THIS ROUTINE DUMPS OT ALL THE MTTR AND MMH TOTALS ACROSS ALL
C SUBSYSTEMS.  WHEN INCREASING THE NUMBER OF SUBSYSTEMS,
C CHANGE THE 40'S IN THE RIGHT SUBSCRIPTS BELOW TO THE NEW NUMBER.
C ALSO CHANGE THE DIMENSION OF "DUM" TO THE NEW NUMBER OF LRU'S.
C
      DIMENSION NUML(40),KLRU(40),TSFL(7,40),PSM(7,40),
     * NSAFSC(7,40),JNAC(40),FHBMA(40),NSFSE(7,40),HFAC(40)
C
      DIMENSION LABEL(8)
      COMMON/LABL/LABEL
C
      DIMENSION ASUB(21,40)
      DIMENSION SWUC(40),SFSE(2,7,40),SFAFSC(5,7,40)
      DIMENSION SNAME(5,40)
      DIMENSION SEQID(40)
      COMMON/SUBS/SNAME,TSFL,PSM,SWUC,SFSE,
     * SFAFSC,NSAFSC,NSFSE,FHBMA,JNAC,HFAC
C
C
      COMMON/SIZES/NSUB,NLRU,KLRU,NUML
      COMMON/EQIDS/SEQID,DUM
      DIMENSION DUM(120)
      DIMENSION TOT(21),TITLE(2),FORMAT(4),FIELD(6)
      DATA TITLE/4HMTTR,3HMMH/
      DATA TOTAL/5HTOTAL/
      DATA FIELD/4HF8.5,4HF8.4,4HF8.3,4HF8.2,4HF8.1,4HF8.0/
      DATA FORMAT/6H(1XA7,,3H1X9,4HF8.4,1H)/
C
C
      WRITE(6,10) TITLE(M),LABEL
   10 FORMAT(1H1,A4,1X18HFOR ALL SUBSYSTEMS,5X8A10/
     * 40HOSUBSYS   AGE F/L   TS F/L     R+R     VR+R  ,
     * 40H CND A/C  M A/C    VM A/C   SHOP  TOT/OUT/
```

```
     * 1X39H------ ------- ------   ---   ----,
     * 40H ------- -----  ------  ----  -------/)
C
      DO 20  J=1,21
   20 TOT(J)=0.0
C
C FIND FORMAT
      T15=0.0
      DO 25  J=1,NSUB
   25 T15=T15+ASUB(15,J)
      JF=ALOG10(T15)+1
      IF (JF.LT.1) JF=1
      IF (JF.GT.6) JF=6
      FORMAT(3)=FIELD(JF)
C
C
      DO 40  JSUB=1,NSUB
      WRITE(6,FORMAT) SEQID(JSUB),ASUB(13,JSUB),ASUB(14,JSUB),
     * ASUB(3,JSUB),ASUB(4,JSUB),ASUB(10,JSUB),
     * ASUB(11,JSUB),ASUB(12,JSUB),ASUB(5,JSUB),
     * ASUB(15,JSUB)
C
      DO 35  J=1,21
   35 TOT(J)=TOT(J)+ASUB(J,JSUB)
   40 CONTINUE
      WRITE(6,49)
   49 FORMAT(8X9(1X7(1H-)))
      WRITE(6,FORMAT) TOTAL,TOT(13),TOT(14),TOT(3),TOT(4),TOT(10),
     * TOT(11),TOT(12),TOT(5),TOT(15)
      RETURN
      END
```

```
        SYMBOLIC REFERENCE MAP (R=1)

ENTRY POINTS
    3  DUMP2

VARIABLES      SN  TYPE            RELOCATION
    0  ASUB         REAL       ARRAY    F.P.            50  DUM       REAL       ARRAY    EQIDS
 6370  FHBMA        REAL       ARRAY    SUBS           256  FIELD     REAL       ARRAY
  252  FORMAT       REAL       ARRAY                  6510  HFAC      REAL       ARRAY    SUBS
  217  J            INTEGER                            221  JF        INTEGER
 6440  JNAC         INTEGER    ARRAY    SUBS           222  JSUB      INTEGER
    2  KLRU         INTEGER    ARRAY    SIZES            0  LABEL     INTEGER    ARRAY    LABL
    0  M            INTEGER             F.P.             1  NLRU      INTEGER             SIZES
 5310  NSAFSC       INTEGER    ARRAY    SUBS          5740  NSFSE     INTEGER    ARRAY    SUBS
    0  NSUB         INTEGER             SIZES           52  NUML      INTEGER    ARRAY    SIZES
  740  PSM          REAL       ARRAY    SUBS             0  SEQID     REAL       ARRAY    EQIDS
 2520  SFAFSC       REAL       ARRAY    SUBS          1440  SFSE      REAL       ARRAY    SUBS
    0  SNAME        REAL       ARRAY    SUBS          1370  SWUC      REAL       ARRAY    SUBS
  250  TITLE        REAL       ARRAY                   223  TOT       REAL       ARRAY
  121  TOTAL        REAL                               310  TSFL      REAL       ARRAY    SUBS
  220  T15          REAL

FILE NAMES          MODE
       TAPE6        FMT

EXTERNALS           TYPE    ARGS
       ALOG10       REAL        1 LIBRARY

STATEMENT LABELS
  127  10      FMT                      0  20                                   0  25
    0  35                               0  40                                 176  49      FMT

LOOPS  LABEL     INDEX      FROM-TO     LENGTH    PROPERTIES
   25  20        J            38 39         2B     INSTACK
```

```
     35  25       J              43 44          3B     INSTACK
     53  40     * JSUB           51 59         37B              EXT REFS  NOT INNER
    104  35       J              57 58          3B     INSTACK
   COMMON BLOCKS    LENGTH
          LABL           8
          SUBS        3440
          SIZES         82
          EQIDS        160
0  STATISTICS
     PROGRAM LENGTH                    302B       194
     CM LABELED COMMON LENGTH         7152B      3690
          52000B CM USED
```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